Fall 2018

The Relationship Between Teachers' Perception of Data-Driven Instructional Leadership and Their Sense of Efficacy and Anxiety for Data-Driven Decision-Making

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THE RELATIONSHIP BETWEEN TEACHERS' PERCEPTION OF DATA-DRIVEN

INSTRUCTIONAL LEADERSHIP AND THEIR SENSE OF EFFICACY AND ANXIETY

FOR DATA-DRIVEN DECISION-MAKING

by

JARVIS J. PRICE

(Under the Direction of Lina B. Soares)

ABSTRACT

The purpose of this study was to ascertain the relationship between teachers' perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. Additionally, the research study examined if teachers' school level (elementary or secondary) influenced their perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. The researcher utilized a correlational research design and correlational/regression analysis to conduct this study based on the theoretical framework of Bandura's social learning theory. The researcher surveyed 300 full-time certified educators in a rural school district located in the southeastern United States using the Data-informed School Leadership Framework (DISL) and Data-driven Decision-making (DDDM) Efficacy and Anxiety instruments (3D-MEA). The results of the correlational analysis indicated a strong positive relationship indicating that those with higher DISL scores tended to report higher DDDM efficacy. The results of the correlational analysis also indicated that a significant relationship did not exist between DISL scores and DDDM anxiety. Finally, multiple regression analyses revealed that data-driven instructional leadership was a significant predictor of DDDM efficacy; however, data-driven instructional leadership was not a significant predictor

of DDDM anxiety. In addition, school level was not significant in either equation reflecting similar findings at both the elementary and secondary levels.

INDEX WORDS: Teachers' perception, Self-efficacy, Anxiety, Data-driven Decision-making, Principal instructional leadership, Georgia, Leadership practices, Elementary, Secondary

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Fulfillment of the Requirements for the Degree

DOCTOR OF EDUCATION

STATESBORO, GEORGIA

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DEDICATION

I wish to dedicate this dissertation to my parents, Michael and Nadeene Price, whose sacrifices and selflessness allowed me to purse a doctoral degree without fear of failure. I doubt this journey would have been possible without the unwavering support and encouragement of my sisters and brother.

Most of all, I want to dedicate this dissertation to my wife Ashley Price, who sacrificed countless weekends. The balancing of work commitments, completing a doctoral program, and complications of everyday life were challenges that I did not handled the best at times, and I thankful for my wife tolerating my shortcoming and being supportive throughout the journey of becoming Dr. Jarvis J. Price.

ACKNOWLEDGMENTS

Throughout this process, I was fortunate to have the support of Georgia Southern University. I would like to thank the entire Leadership, Technology, and Human Development department for their guidance and support.

I would also like to express my sincere gratitude to Dr. Lina Soares, my dissertation chair, for her mentorship and support throughout my academic career. Dr. Soares's tutelage and mentorship during my time as Ronald. E McNair Scholarship during my time as a Georgia Southern undergraduate student spawned my internal belief that I could obtain a doctoral degree. I am grateful for the critical and meaningful advice received from Dr. Soares on numerous occasions and for the family-like care I have received over the past ten years.

Finally, I am appreciative of committee members, Dr. Teri Melton and Dr. Cordelia Zinskie, who provided honest and informative feedback throughout the dissertation process. Each of their expertise and experiences transformed my first study from a surface level exploration of DDDM to a robust study that examined multiple levels of DDDM.

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CHAPTER 1

INTRODUCTION

The American educational system focuses on improving student achievement and educational outcomes for all students, regardless of socio-economic status, ethnicity, mental ability and capacity, or religious affiliation. The intense focus on educational outcomes for all students occurred with the passing of the No Child Left Behind Act (NCLB) of 2001, which was reauthorized in 2015 as Every Student Succeeds Act (ESSA). NCLB ushered in an area of accountability for schools by using mandatory testing of all students in grades three through eight, as well as individual courses at the secondary level. Subsequently, the federal government introduced the process of assessing schools' effectiveness based on standardized test scores from state-authored assessments and holding schools accountable for every student's academic success as defined by proficiency targets on the state-authored assessments (Nichols & Berliner, 2007). Additionally, the federal government disaggregated state-authored assessment data by ethnicity, disability, socioeconomic status, and English Language Learners to determine a school's Adequate Yearly Progress (AYP) towards meeting federal proficiency targets (NLCB, 2001).

Due to the enactment of NCLB, schools and districts have developed processes and systems to assess their school and district performance compared to federal and state proficiency targets for the entirety of their school populations and the federally defined subgroups. The state assessments provide data that schools must make sense of to improve student outcomes. The emergence of data as a driver of school improvement became known as data-driven decision-making (DDDM). DDDM can be defined as the systematic collection of student assessment data and other related school metrics (e.g., attendance, discipline, and teacher certification; Mandinach, Friedman, & Gummer, 2015; Marsh & Farrell, 2015) and has evolved into a school

reform message sweeping across the United States educational system. DDDM has a two-fold purpose: (a) to allow teachers to adjust instruction on a student or group basis contingent upon student performance data (Rallis & MacMullen, 2000); and, (b) to determine the allocation of school resources and instructional initiatives that are aimed at increasing student educational outcomes. While the DDDM process is typically viewed from the district and administration levels, few researchers have examined the DDDM process at the school level where it is most needed (Dunn, Airola, Lo, & Garrison, 2013). The responsibility of improving student outcomes has transitioned from solely a district-led initiative to a school-based initiative, with the principal as the primary decision-maker and instructional leader (Reeves, Summers, & Grove, 2016).

Since 2001, scholars have conducted research on the use of data to inform district and school practices; however, few have examined teachers' perceptions of the effectiveness of data-driven decision-making and their sense of self-efficacy to translate data disaggregation into appropriate interventions in the classroom. To maximize the potential of DDDM, administrators must assess the barriers inhibiting teachers from adopting DDDM to improve student achievement, adopt research-based instructional practices, and differentiate instruction (Datnow & Hubbard, 2015; Schildkamp, Karbautzki, & Vanhoof, 2014). The adoption of DDDM cannot occur without first calling on principals to understand how to identify and raise the self-efficacy and decrease anxiety of each teacher concerning DDDM, as well as to ascertain the principal's practices that influence the adoption of DDDM (Datnow & Hubbard, 2015). In the current study, the researcher addressed that need.

Background

With the end of the George W. Bush presidency and inauguration of President Barack

H. Obama in 2009, the educational reform movement continued with the creation of the Race to the Top (RT3; U.S. Department of Education, 2010). RT3 is a competitive grant program that is intended to advance reforms in four main areas: (a) adoption of rigorous standards and assessments; (b) development of data systems that measure student growth and inform teachers' and principals' instructional practices; (c) rewarding teachers and administrators based on student performance; and, (d) using innovative strategies to turn around the lowest performing schools. After the passage of RT3 in 2010, the four reform measures presented lofty goals for administrators and teachers and new expectations were put in place. For the first time, the federal government determined that student test scores must be a factor when evaluating teacher performance, and that the emergence of student growth must be an indicator of school success (U.S. Department of Education, 2010). As a result, RT3 directly impacted the role of school principals. The principal now had the responsibility to assist teachers with disaggregating student performance data at the classroom level and utilizing state-administered assessments to improve student outcomes (Spires, 2015). Specifically, the continued focus on data as the driver of evaluation systems for educators and school effectiveness brought forth changes at the administration level, resulting in the principal's role as the primary decision-maker and instructional leader (Reeves et al., 2016).

Principal Instructional Leadership

The principal's role as the instructional leader requires the principal to assess his or her school's instructional needs to effectively improve the quality of instruction provided to students, allocate funds to support academic interventions for problematic academic areas, and continuously identify areas of growth. Additionally, the principal must ensure that teachers receive the appropriate professional development to assist in addressing the target growth areas

(Hallinger, 2005; Petrides, 2006; Saltzman, 2016). A significant area of growth for teachers is translating available data sources into actionable instructional initiatives to increase student outcomes.

Due to the passage of Every Student Succeeds Act (2015) and Race to the Top (2010) grant program, a core tenet of principal instructional leadership is the disaggregation of student performance on federal and state assessments; student performance and non-academic data should inform decision-making (Sun, Przybylski, & Johnson, 2016). The principal's role in data-driven decision-making starts with the initial decisions of the type of data to be collected and its purpose. Lai and McNaughton (2016) noted that is easy to collect a lot of data that are not useful for decision-making, or to collect data that are readily available, rather than data that should be collected with an intentional purpose to refine instruction, improve teacher pedagogy, and increase teachers' abilities to assess relevant data. The analysis of school performance determines the quality of instruction to be provided to students (Marsh, Bertrand, & Huguet, 2015). Once the principal has identified areas of concern, the principal is tasked with identifying initiatives and interventions to improve school-wide instruction through the development of a school improvement plan in collaboration with school-based instructional leaders, district personnel, and local educational agencies (Jennings, 2012). The principal sets the vision and creates the school culture, which embraces data-driven decision-making and supports the school vision through professional development.

The school improvement plan and the process must be aligned with a principal's vision for improving student outcomes and developing a school culture that systematically and continuously looks for avenues to improve instructional pedagogy and data-driven decision-making (Murray, 2013). The principal is responsible for allocating funding for professional

development, approving the purchase of programs and instructional materials, and reviewing and adjusting staff to ensure a linear alignment between the school improvement plan and school resources (Marsh & Farrell, 2015).

While teachers are at the early stage of using student data to inform teaching-related decisions, principals and district-level personnel have the benefit of professional development offerings that focus on translating student performance results into actionable plans for student growth the subsequent year (Sun et al., 2016). Because principals receive training related to data-driven decision-making, it is expected that principals have obtained the knowledge and skills necessary to model for their staff on how to use student data to improve educational outcomes.

In contrast, classroom teachers have not received sufficient professional preparation pertaining to data-driven decision-making (Levin & Datnow, 2012). At the heart of school improvement is the ability to translate data into actionable items that focus primarily on improving student outcomes. For DDDM to be successfully integrated into a teacher's repertoire of skills, a teacher's self-efficacy must be raised to a level of sufficiency for analyzing assessment results (Mandinach & Jimerson, 2016).

Teacher Sense of Self-efficacy and Anxiety for Data-driven Decision-making

The importance of teacher self-efficacy and its impact on student achievement is a growing field of study, which continues to inform the practices of school leaders and higher education in raising the self-efficacy levels of pre-service and veteran teachers. To increase the use of DDDM at the classroom level and use data to target instructional strategies that translate into improved student outcomes, the principal must address teachers' self-efficacy and anxiety towards DDDM via modeling appropriate data practices, implementing DDDM professional development, and adhering to a data-friendly ecosystem (Jimerson & Wayman, 2015).

Teacher self-efficacy has been described as a teacher's belief in his or her ability to be successful at completing a task (Bandura, 1997). Bandura noted that self-efficacy beliefs are essential determinants in the acquisition of new knowledge and applying that new knowledge to differing context. Conversely, teacher anxiety is a construct that is in stark contrast to a teacher's sense of self-efficacy. Teacher anxiety is an indicator that feelings of inefficiency or inadequacy exist in the classroom and it is not uncommon for teachers to feel anxious about their ability to use data to inform instruction and to improve student outcome. Dunn, Airola, Garrison, and Nickens (2011) referred to DDDM anxiety as the levels of apprehension teachers experience when confronted with the task of utilizing DDDM.

Researchers have not investigated teachers' sense of self-efficacy and teacher anxiety simultaneously concerning data-driven decision-making. In this study, the researcher examined the relationship between teachers' perceptions of data-driven instructional leadership and teachers' self-efficacy and anxiety regarding data-driven decision-making. Additionally, the research study examined if teachers' school level (elementary or secondary) influenced their perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making.

Statement of the Problem

In K-12 education, principals are expected to use their instructional knowledge to lead school improvement initiatives and improve student outcomes. Researchers have identified the use of school performance data to inform instructional and organizational practices as a tool to increase student outcomes as a core principle of instructional leadership and school improvement. Across the educational landscape, DDDM has become a core tenet of educational reform in the 21st century; therefore, principals and school leaders must continue to assess the

barriers adversely impacting the adherence to continuous DDDM practices at the classroom level. While much has been written about using school performance data at the district or system level, researchers have not addressed the principal's instructional leadership and data behaviors to support teachers' data-driven decision-making to inform instruction and improve student outcomes.

In the state of Georgia, the role of principals as instructional leaders has increased dramatically. With the adoption of RT3 in 2010, Georgia received $400 million from the initiative; as a condition for receiving the $400 million, Georgia was required to institute a teacher performance-based evaluation system whereby a teacher's performance is linked to students' test scores. This evaluative link between a teacher and his/her students test scores was uncharted territory for the state. In Fall 2012, Georgia implemented the Teacher Keys Effectiveness System (TKES) for the 26 school districts that were part of the initial funding of RT3 and revised the summer of 2016. TKES consisted of multiple components, including the Teacher Assessment on Performance Standards (TAPS), professional growth, and measures of student growth and academic achievement. In the initial implementation of TKES, the measures of student growth and academic achievement would not impact a teacher's evaluation; the student growth component was delayed until a time determined by the Georgia legislature and governor. In the interim, a teacher's individual evaluation of effectiveness is determined by the TAPS.

The TAPS is a behavioral summary scale that guides evaluators in assessing how well a standard is performed; the scale ranges from a Level I (ineffective rating) to Level IV (exemplary rating) with the expected performance rating a Level III. The TAPS consist of 10 standards that reflect the expectations of teachers and their instructional practices; the descriptors

are considered an overview of expectations and not a checklist of actions. Additionally, each of the 10 standards are paired within the five following domains: Planning, Instructional Delivery, Assessment of and for Learning, Learning Environment, and Professionalism and Communication.

The problem of practice arises with DDDM on Standard 4 - Differentiated Instruction, Standard 5 - Assessment Strategies, and Standard 6 - Assessment Uses. The underlying skills to be rated a Level 3 require the disaggregation of data at the student level, as well as the deconstruction of the standard at the skill level to identify the interventions necessary to raise student performance. Administrators have received professional development in data disaggregation and school improvement planning; however, DDDM and school improvement planning have not been a professional development focus for teachers at the classroom level. The state of Georgia provided Formative Instructional Practices (FIP) modules aligned to Standard 4 - Differentiated Instruction, Standard 5 - Assessment Strategies, and Standard 6 - Assessment Uses; however, teachers have not been required complete the FIP modules nor provide evidence of data driving their decisions. The TAPS of assessment strategies, assessment uses, and differentiation are a three-legged stool on which DDDM sits. Due to the expectation of classroom teachers' level of integration of DDDM throughout the United States, particularly in the state of Georgia, the instructional characteristics of a principal that contribute to higher levels of teachers' self-efficacy on data-driven decision-making and low anxiety was paramount; thus, there was a need for researchers to examine the relationship between teachers' perception of data-driven instructional leadership and their sense of self-efficacy and anxiety toward DDDM.

Purpose Statement

The shift in the educational paradigm toward instructional decisions that are determined

specifically by performance data has caused states throughout the country to provide training for

district administrators and principals related to DDDM; however, limited professional

development has been designed to develop or enhance classroom level DDDM. The lack of

professional development for teachers in DDDM at the classroom level has left the responsibility

of developing a school culture of DDDM to the principal (Jimerson & Wayman, 2015; Marsh &

Farrell, 2015; Staman, Visscher, & Luyten, 2014). To effectively implement DDDM and

cultivate a data-driven decision-making culture, the principal should exhibit the characteristics of

an instructional leader by managing the instructional program and creating structures that support

the integration of classroom level DDDM (White, 2014). The responsibility of improving

student achievement has transitioned from being primarily district-led to the primary

responsibility of the principal as the primary decision-maker and instructional leader at the

school level (Reeves et al., 2016).

The purpose of this research study was to ascertain the relationship between teachers'

perception of data-driven instructional leadership and their sense of self-efficacy and anxiety

towards data-driven decision-making. Additionally, the research study examined if teachers'

school level (elementary or secondary) influenced their perception of data-driven instructional

leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. The

results of this research are essential to deepening the literature regarding DDDM beyond the

system level and helping instructional leaders understand how to best support teachers to be data-

driven.

Research Questions

According to Earl and Fullan (2003), "School leaders are caught in the nexus of

accountability and improvement, trying to make sense of the role that data can and should play in

instructional leadership" (p. 383). From this perspective, it is important to understand that in order to improve the educational outcomes for all students, all faculty, including a school's principal, have a stake in student achievement. To investigate the relationship between teachers' perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making and to examine teachers' sense of self-efficacy and anxiety across the elementary and secondary, the researcher developed the following research questions:

1. What are teachers' perceptions regarding data-driven instructional leadership?

2. What are teachers' self-reported self-efficacy and anxiety regarding DDDM?

3. What is the relationship between teachers' perceptions of data-driven instructional leadership, school level (elementary and secondary), and teacher sense of self-efficacy and anxiety for data-driven decision-making?

Theoretical Framework

The purpose of this research was to ascertain the relationship between teachers' perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. As a result, the researcher applied Bandura's (1977) social learning theory as the primary theoretical framework to explain concepts and provide a lens to understand the results of the study. Based on Bandura's theory, learning is a cognitive process that is augmented by the social environment in which a person exists. The theory is founded on the concept of reciprocal determinism which links the fundamental contributions of the cognitive aspects, behavioral factors, and the environmental variables in the explanation of the learning process (Bandura, 1977). The interlinking of these concepts is such that when one of the three critical components is compromised, the learning process is likely to be impaired (see Figure 1). From this perspective, social learning theory endorses and agentive conception of human

development in that people can act in shaping their own lives (Bandura, 2006). Teachers and

parents must, therefore, be critical of the environments to which their children are exposed,

because such environments can be recipes for deviant behavior, and can also impair cognitive

growth. According to Charalambous and Philippou (2010), a teacher is expected to have the self-

efficacy that empowers his or her to defy adversities and adopt innovative approaches to learning

processes.

Behavior

**Environmental
Factors**
**Cognitive
Factors**
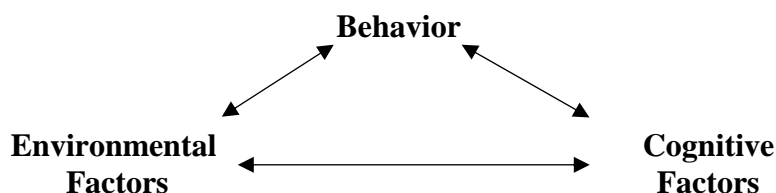
Figure 1. A conceptual framework for social learning theory (Bandura, 1977).

One critical requirement in the teaching profession is the self-belief that teachers have in

their abilities. Teachers ideally act as agents of positive change in society, and they are expected

to participate actively in character remodeling (Clark, 2013). In such instances, the teachers

encounter learners from different sociocultural and religious backgrounds with specific beliefs

and practices that antagonize the teacher's sense of good and wrong (Clark, 2013). The

development of a rapport between the teacher and such learners is, therefore, only realizable

when teachers can move outside their comfort social environments and attempt to understand the

specific reasons behind the behaviors noted in the learners. According to Charalambous and

Philippou (2010), teachers must have some belief in their ability to impart a positive change in

the learning curve of the students in order for them to make such sacrificial moves of

understanding behavior changes. Charalambous and Philippou further posited that teachers are

affected by socioemotional aspects that must be critically balanced in order to remain focused on

the primary goals of the teaching process.

There are cases when the teaching profession was considered as a rigid practice that promoted compliance to predefined approaches. Some teachers have defied odds to modify learning environments, with the ultimate objective of realizing the immediate learning goals (Mandinach et al., 2015). Such teachers are characterized by innovativeness and are also considerable risk-takers; however, they also have self-confidence, which enables them to maintain belief in their different approaches. The belief in their abilities also enables them to look beyond the existent challenges and to adopt effective change programs. Other scholars have shown that these exceptional teachers comply with DDDM processes by referencing past instructional successes and failures, desegregating student performance data, and strictly adhering to adjusting instruction contingent upon student performance (Jimerson & Wayman, 2015; Mandinach et al., 2015; Mandinach & Gummer, 2013). Thus, teachers can remain persistent and resistant to stress even when faced with tough obligations. A teacher's ability to adapt and modify his or her behaviors to thrive in dynamic environments is reflective of the social learning theory. Under this model, efficacious teachers empower their students with skills to overcome obstacles in their learning curves and remain behaviorally compliant to the prevailing social norms.

On a different perspective, researchers have noted that some teachers have relatively low degrees of belief in their self-abilities. Such teachers provide a classroom setup founded on doubt (George, Hall, & Stiegelbauer, 2006). Consequently, the learners remain highly restricted in their learning curves, a feature that negatively affects their abilities to think creatively and critically. Learners developed under such environments are thus poor problem-solvers. They are relatively anxious and are characteristically resistant to applying new theoretical approaches and past experiences in problem-solving (George et al., 2006).

Some theorists have noted that teachers' concerns influence the learning processes. The specific impacts from the concerns relate to the creation of negative learning environment, a concept supported by Dunn et al. (2013). Such concerns can thus be defined as hierarchical patterns of feelings, thought processes, and considerations towards a given task. This general hierarchy of teachers' concerns can be classified into three major classes: self, task, and impact (Clark, 2013). The classes are further classified into seven stages to reflect the specific paths involved in the learning process. The general focus includes the consequences, collaboration, and refocusing during the teaching and learning process. When teachers have concerns about the effectiveness of their methods, it is advisable that they refocus their approaches to ensure the successful dissemination of information. Collaborative approaches are instrumental as tools for fostering understanding between teachers, hence enabling the staff to develop unified approaches to teaching. Teachers require collaborative approaches to disseminate information to their students effectively (Datnow & Hubbard, 2015; Hattie & Timperly, 2007). On the other hand, collaborative engagements enable the teachers to identify the probable weaknesses in their proposed teaching approaches and gauge the probability of success if the methods are adopted as teaching and learning tools (Dunn et al., 2013).

While concerns and self-efficacy appear to be central to the theory of social learning, it is also notable that there are challenges in defining the relative association between the two concepts. Hoffman (2010) outlined the need for collaborative approaches that address the concerns related to the implementation of self-efficacy and concerns of the teaching environment. Hoffman suggested that there is a dynamic relationship between self-systems, which are constituted on individual perceptions, beliefs, thought processes, and the ability of teachers to encourage positive learning environments in classrooms. Nevertheless, it is

instrumental to exhaustively review the concepts to ascertain the level of involvement of teachers in the establishment of a positive learning environment in line with Bandura's (1977) social learning theory.

<p style="text-align:center">Significance of the Study</p>

The notion of instructional strategies and school improvement plans being empirically driven is pivotal in the 21st-century governance of schools. Due to the increased pressure on administrators to close the achievement gap between the highest and lowest performers in their respective schools, understanding how to improve DDDM at the classroom level is critical to the school improvement process (Kerr, Marsh, Ikemoto, Darilek, & Barney, 2006).

Professionals can use the information gleaned from this study to inform the professional development needs for a school and school system. With the information obtained, administrators can improve their instructional leadership practices in the areas of curriculum and assessment. Superintendents and local school boards can use the study findings to provide funding for professional development opportunities for teachers and administrators addressing DDDM.

The findings of this study have contributed to the existing literature regarding DDDM and the research has established a much-needed focus regarding the relationship between data-driven instructional leadership and teachers' sense of self-efficacy and anxiety involving data, as well as the increased capacity of teachers to use data to improve instructional strategies to raise student achievement. Researchers have not investigated teacher sense of efficacy and teacher anxiety simultaneously concerning data-driven decision-making. Thus, the results from this study have the potential to help instructional leaders understand how to best support teachers to be data-driven decision-makers.

Procedures

The current researcher implemented a correlational research design in order to examine the relationship between teachers' perceptions of data-driven instructional leadership and teachers' sense of self-efficacy and anxiety for data-driven decision-making. Another intent was to determine whether there was a difference in the relationship between teachers' perceptions of data-driven instructional leadership and teachers' sense of self-efficacy and anxiety for DDDM at the elementary and secondary levels. The three major variables in this correlational study were teachers' sense of self-efficacy for DDDM, teachers' anxiety for DDDM, and teachers' perceptions of data-driven instructional leadership. Data-driven instructional leadership was the predictor variable, and teacher sense of self-efficacy and anxiety for DDDM were the criterion variables. School level was included in the analyses as a control variable.

The population for this research study consisted of full-time teachers from a rural southeastern school system in Georgia. The county consists of three elementary schools, one middle school, and one high school. Each full-time teacher in the district was eligible to participate. Together, the available population for this study included approximately 300 certified teachers. Each participant in the study was presented a survey electronically through *Qualtrics* and provided the opportunity to participate in the study by completing the designated survey for their school level in the district. Teacher participation in this survey was anonymous and voluntary; participants could decline or withdraw from the survey at any time without penalty. The researcher aggregated the survey data due to the limited number of schools, which ensured that the results would not allow for the identification of a particular principal or school. Elementary schools were considered those that service Pre-K through grade 5, and secondary schools were considered those that service grade 6 through grade 12.

Embedded within the survey were two existing surveys. The two surveys consisted of the Data-Informed School Leadership (DISL) Framework (Sun et al., 2016) and the Data-driven Decision-making Self-efficacy and Anxiety Inventory (3D-MEA; Dunn & Dunn, 2012).

DISL. The data-informed school leadership instrument assesses a teacher's perception of instructional leadership data practices. Sun et al. (2016) developed the instrument through the review of 200 empirical studies that examined instructional leadership practices and data use. From the review of studies, the researchers developed a survey that focused on nine effective leadership practices separated into the following four leadership domains: Data-based Goal Setting, Developing Teachers' Decision-making Capacity, Building a Data-wise Culture in Schools, and Improving Instruction Based on Data. The instrument was constructed and validated by Sun et al. (2016) in the state of Alabama, where the researchers administered the survey to all middle schools in one school district. The DISL consists of nine items on a 6-point Likert scale. The current researcher did not modify or alter this survey instrument for the study.

3D-MEA. The 3D-MEA Inventory was developed from the collaboration of two researchers, who developed the DDDM professional development for teachers and an educational psychologist who served as an outside evaluator for the project. The survey instrument was first administered in a study conducted by the developers, Dunn et al. (2011), to ascertain a teacher's sense of self-efficacy and anxiety for DDDM and through repeated administrations, validity and reliability of the 3D-MEA Inventory was established. The 3D-MEA Inventory consists of a 5-point Likert scale with 20 questions. The current researcher did not modify or alter this survey instrument for the study.

Data Collection and Analysis

The researcher administered the survey instruments through *Qualtrics.* The researcher

keyed the survey results into the Statistical Package for Social Sciences (SPSS) in order to conduct a correlational analysis among the three variables. Additionally, the researcher conducted a regression analysis to ascertain how much data-driven instructional leadership explains teachers' sense of self-efficacy and anxiety for DDDM. To determine the relationship between teachers' perception of data-driven instructional leadership and teachers' sense of self-efficacy and anixety for data-driven decision-making, the researcher incorporated the school level variable into the regression analysis.

Definitions of Key Terms

The researcher utilized the following key terms frequently throughout the study:

Data. Data are pieces of information and include assessment data (e.g., state or district benchmark test scores, student performance on classroom-based formative and summative assessments, such as running records, and student work), as well as other types of data such as student attendance and demographics (Reeves et al., 2016).

Data-driven Decision-making Efficacy and Anxiety (3D-MEA). The 3D-MEA Inventory is a survey utilized in the research. The survey instrument was developed by Dunn et al. (2011) to ascertain a teacher's sense of self-efficacy and anxiety for data-driven decision-making.

Data-driven Decision-making Sense of Self-efficacy (DDDM Self-efficacy). Data-driven decision-making self-efficacy is defined as teachers' beliefs about their abilities to successfully engage in classroom level data-driven decision-making (Dunn et al., 2011).

Data-driven Decision-making Sense of Anxiety (DDDM Anxiety). Data-driven decision-making anxiety is defined as the worry, tension, and apprehension that teachers feel about engaging in data-driven decision-making (Dunn et al., 2011).

Data-informed School Leadership (DISL) Framework. The data-informed school leadership instrument assesses a teacher's perception of instructional leadership data practices (Sun et al. (2016)). The instrument assesses four leadership domains using a six-point Likert scale ranging from *Strongly Disagree* to *Strongly Agree*.

Teacher Keys Effectiveness System (TKES). The Teacher Keys Effectiveness System (TKES) consists of three components which contribute to an overall Teacher Effectiveness Measure (TEM): Teacher Assessment on Performance Standards (TAPS), Surveys of Instructional Practice (student perception surveys), and Student Growth (SGP and SLO; GA DOE, 2016c).

Instructional leadership. For the purpose of this research, the researcher defines principal instructional leadership and instructional leadership as "an influence process through which leaders identify a direction for the school, motivate staff, and coordinate school and classroom-based strategies aimed at improvement in teaching and learning" (Hallinger & Murphy, 1985, p. 7).

Leader Keys of Effectiveness System. The Leader Keys Effectiveness System (LKES) consists of three components which contribute to an overall Leader Effectiveness Measure (LEM): Leader Assessment on Performance Standards (LAPS), Student Growth, CCRPI School Climate Star Rating Survey, and a Combination of Additional Data (GA DOE, 2016b).

Teacher concern. Teacher concern refers to one's set of thoughts and feelings about an innovation that includes perceptions, preoccupations, considerations, contentment, and frustration (Dunn et al., 2011).

School level. For the purposes of this study, elementary schools were considered those that service students in Pre-K through grade 5, and secondary schools were considered

those that service students in grade 6 through grade 12.

Chapter Summary

DDDM is a critical part in raising student achievement and is part of teacher evaluation systems across the United States. Findings in the body of related literature have indicated an increased usage of DDDM at the system level due to the reauthorization of the Elementary and Secondary Education Act and the creation of the Race to the Top Fund that aimed to support improvements in teaching and learning that leads to improved student outcomes. The RT3 initiative promotes student achievement as a component of teacher evaluations and principal evaluations. Due to this increased scrutiny, it is important to learn the relationship between data-driven instructional leadership practices and teachers' self-efficacy and anxiety concerning DDDM. Scholars have provided a firm foundation for the need for DDDM at the system level; however, there is a gap in the research literature regarding the relationship between instructional leadership data practices and teachers' ability to implement data decision-making practices.

CHAPTER 2

REVIEW OF THE LITERATURE

The purpose of this study was to ascertain the relationship between teachers' perceptions of data-driven instructional leadership practices and the teachers' self-efficacy and anxiety towards data-driven decision-making. Additionally, the research study examined if teachers' school level (elementary or secondary) influenced their perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. Accordingly, the researcher has organized this literature review into supporting categories that serve as a foundation for the study. To begin, the researcher first examines the historical development of data as the driver of school reform. Following this discussion, the researcher examines the impact that federal and Georgia state laws have had on the role of the principals and teachers as it relates to DDDM. The researcher then examines Georgia accountability measures and DDDM. Within the DDDM component of the literature review, subcategories are included that explore DDDM as it relates to teachers, principals, professional development, DDDM at different school levels (elementary and high school), state and federal influence on DDDM practices, and DDDM technology.

Historical Development of Data-driven Instruction

Regardless of any student's mental ability and capacity, socio-economic status, ethnicity, or religious affiliations, the American educational system focuses on improving student achievement. With the passing of the No Child Left Behind Act of 2001 (NCLB, 2001), reauthorized in 2015 as the Every Student Succeeds Act, an intense focus on educational outcomes for all students followed. NCLB brought with it an era of accountability for schools by using mandatory standardized testing of all students in grades three to eight, and individual

courses at the high school level. In addition, the federal government introduced the process of assessing schools' effectiveness based on standardized test scores from state-authored assessments and holding schools accountable for every student's academic growth and success as defined by proficiency targets on the state-authored assessments (Nichols & Berliner, 2007).

Specifically, each state developed yearly proficiency targets for schools to achieve concerning subgroups and overall school performance; if a school met each of the required proficiency targets, the school was credited with making adequate yearly progress (AYP; Dee & Jacob, 2011). If the school did not satisfy state-outlined yearly proficiency goals, the school would be considered as not making AYP and would be subject to consequences and sanctions as defined by the state (Nichols & Berliner, 2007). The most significant consequence of not making AYP for 3 or more years was the prospect of government intervention. If the state intervened, the state could close schools, convert public schools into charter schools, dismiss staff and hire new employees, or implement a school turnaround strategy (Nichols & Berliner, 2007). Before the NLCB Act, the idea of a state-run set of schools without local school board consent and control was not an acceptable option.

In December of 2015, the United States Congress passed the Every Student Succeeds Act. Under ESSA, states are allowed to create their accountability systems, teacher, and administrative evaluation systems, school accountability rating systems, and constructs to measure closing the achievement gap. ESSA still requires schools to annually report the achievement scores of students disaggregated by race, socioeconomic status, educational disability, and English Language-Learners. The transition from NCLB to ESSA reinforced the belief that student performance is attributable to a school or school district's ability to use data to

identify student weakness and implement initiatives to strengthen weak areas. In addition, ESSA continues to impact states' accountability.

Georgia Context

In order to understand the development of the use of data to inform district and school practices within the Georgia context, it is necessary to present the reader with a historical overview of the developments that have led to data-driven decision-making in Georgia. Specifically, the researcher will review a series of federal and state legislative reforms that spurred the enactment of DDDM.

A Plus Reform Act of 2000

To begin, the Georgia General Assembly, in conjunction with Governor Roy Barnes, passed the *A Plus Education Reform Act of 2000*, O.C.G.A. §20-2-281, which introduced a new slate of state-required testing that satisfied the federal testing mandates of NCLB (2002). Under the *A Plus Education Reform Act of 2000*, all students in the state of Georgia were required to take the Criterion-Referenced Competency Test (CRCT) in grades 1 through 8 in the content areas of mathematics, reading, English language arts, and mathematics. Students in grades 3 through 8 were also required to take assessments in science and social studies.

The A Plus Education Reform Act further mandated End-of-Course Tests (EOCT) at the secondary level to serve as the final exam for students enrolled in specific courses in the areas of mathematics, social studies, science, and English language arts. The CRCT and EOCT were aligned with Georgia's state-mandated standards and included assessment of specific content knowledge and skills. The assessments provided a diagnostic of student mastery of knowledge and expertise to be successful in the next designated course and grade level.

Following the implementation of the CRCT and EOCT, in 2002, Governor Roy Barnes mandated the passage of the Georgia High School Graduation Test and Georgia High School Writing Test for a student to receive a high school diploma and required students in grades 3, 5, and 8 in the areas of mathematics and reading to score proficient on the CRCT in order to be promoted to the next grade level.

Race to the Top

In 2009, the United States Congress passed the American Recovery and Reinvestment Act (ARRA); in doing so, federal mandates and regulations designed to address the need of DDDM grew into sharper focus. When AARA was signed into law, with it came the $4.35 billion Race to the Top Fund (RT3) (US DOE, 2010). The Race to the Top Fund was a competitive grant program designed to reward states that adopted policies and initiatives to create conditions for education innovation. Due to RT3, several states revised their accountability systems and shifted towards a holistic measure that accounts for more than student-teacher scores (US DOE, 2010). The Race to the Top initiative aimed to address key areas of K-12 education reform and required an application for states to be considered.

Forty-six states and the District of Columbia submitted comprehensive reform plans to compete in the Race to the Top competition; of these, 19 states received funding to assist with the implementation of their comprehensive reformation plan for education in their state in the four key areas of education reform (US DOE, 2010). The four key areas of reform included:

1. Development of rigorous standards and better assessments;

2. Adoption of better data systems to provide schools, teachers, and parents with information about student progress;

3. Support for teachers and school leaders to become more effective;

4. Increased emphasis and resources for the rigorous interventions needed to turn around the lowest-performing schools.

The underlying documentation required for each of the four key areas to demonstrate the reforms are research-based and are informed by student performance outcomes. Hence, the systematic collection of assessment data to improve student outcomes began.

Georgia and RT3

The state of Georgia submitted an application to receive RT3 and received notification of qualification for entry in the Race to the Top program; Georgia was awarded $400 million to invest in educational reforms and start the implementation of creating new accountability systems to ensure adherence to the federal initiative submitted in Georgia's application and to increase stakeholder accountability at the district and school level to improve student outcomes and teacher quality (GA DOE, 2016b). Georgia's RT3 application led to significant educational changes in Georgia in several key areas, and has had significant ramifications since its inception.

Georgia's performance standards. In accordance with RT3, Georgia changed the standards and assessments utilized throughout K-12 education; the state transitioned away from the Georgia Performance Standards (GPS) and adopted the Georgia Common Core Performance Standards (GCCPS; U.S. DOE, 2010), which have recently been renamed the Georgia Standards of Excellence (GSE). The GSE were developed and implemented with the belief that the standards were more rigorous than the GPS and would raise the educational expectations of students enrolled in Georgia's K-12 public education system (GA DOE, 2016c). The standards required the Georgia Department of Education to develop professional development to teach teachers and administrators how to unpack standards and ensure the instruction provided to students met the higher expected outcomes.

Georgia's school rating scale. To further comply with RT3, Georgia replaced AYP with the College and Career Readiness Performance Index (CCRPI; GA DOE, 2016d), which determines the quality of a school using a 100-point scale. The Georgia Department of Education describes the CCRPI as the following: "CCRPI is a comprehensive school improvement, accountability, and communication platform for all educational stakeholders that will promote college and career readiness for all Georgia public school students" (2016d, para. 1). The CCRPI accounts for a school's achievement data by disaggregating data for each administered assessment, subgroup performance for each assessment, the difference between the state average on assessments and school average on the identical assessments, and several indicators that measure the school in its totality outside of Georgia's state-mandated assessments (GA DOE, 2016d). The CCRPI is intended to be used as a tool to improve educational outcomes for students and provide a roadmap for incremental improvement in school performance through DDDM.

Due to the development of the CCRPI, Georgia can classify schools based on their CCRPI rating. The CCRPI allows for the state to intervene on behalf of the lowest-achieving schools and transform the lowest-achieving schools through additional funding and assigning a school improvement specialist from the Georgia Department of Education or a contracted school improvement specialist from a university or local Regional Educational Service Agency (RESA; GA DOE, 2016d). The CCRPI is not intended to be understood nor described as a deficit model of student learning and capacity. Instead, the report is intended to be utilized as a school improvement tool for a district and for school administrators to look at organizational practices that are barriers to student success and the instructional norms that are counterintuitive to best practices in raising student outcomes (GA DOE, 2016d). The CCRPI performance cannot be

solely assessed at the district and administrative levels; the heart of school improvement and raising student outcomes starts and ends at the classroom level.

      Georgia's assessment reforms. A significant reason for the call for increased rigor in Georgia's standards and assessments are due to the National Assessment of Educational Progress (NAEP) administered to students nationally in grades 4, 8, and 12; particular attention was given to the areas of mathematics and reading (Achieve, 2015; 2016). Georgia is among the states with the largest gap between their reported 2014 state proficiency levels and their state's 2013 NAEP proficiency levels (Achieve, 2015). Georgia led the nation in its NAEP proficiency versus CRCT (state assessment) proficiency achievement gap in the categories of eighth grade reading and eighth grade math proficiency; there was a 65% difference between NAEP proficiency and CRCT proficiency on the reading assessment and a 53% difference between NAEP proficiency and CRCT proficiency on the math assessments (Achieve, 2015; 2016). Due to the decades of disparity in student performance on NAEP versus CRCT performance, the state of Georgia adopted the Georgia Milestone Assessment suite in 2014, allowing it to determine growth in student performance due to the newly adopted Georgia Common Core Performance Standards (GA DOE, 2016e).

      The Georgia Milestone assessments differ than the CRCT assessments due to the inclusion of open-ended (construction-response items), norm-referenced items, and a writing component at every grade level (GA DOE, 2016e). The 2014-2015 Georgia Milestone results aligned closely to the proficiency levels demonstrated on the NAEP assessment suite in 2013; the number of students scoring proficient on the Georgia Milestones assessments was between 25%-30% as compared to previous years of students scoring in the 80%-90% proficiency on the CRCT (Achieve, 2016). The results reverberated across the state of Georgia and heightened the

focus on teacher instruction in the classroom and utilization of data to find the barriers to increased student achievement.

Georgia's statewide data system. The state of Georgia committed to developing data systems to support instruction by developing a statewide longitudinal data system (SLDS), providing access to state results and professional development, using state data, and providing data to use to improve instruction (GA DOE, 2016e). The belief that data and access to information are the drivers of instructional improvement for the enhancement of student outcomes is evidenced in the state's reliance on building a statewide data system (Jennings, 2012). The current system provides teachers and administrators with the historical performance of their students as it relates to the following categories: attendance, enrollment history, academic performance in courses, CRCT and Georgia Milestone assessment performance, demographic information, exceptionalities identification, teacher resources that are tied to the Georgia Standards of Excellence, and an online assessment platform to administer assessments through and item bank developed by Georgia (GA DOE, 2016e). The concentrated effort on data as the vehicle for instructional improvement and increased student outcomes is evidenced in the development and enhancement of the SLDS. Using SLDS is critical for teachers and administrators in assessing their student population and identifying areas for improvement.

Georgia Accountability Measures for Principals and Teachers

The transition of accountability for improving student outcomes from being the primary responsibility of district leadership to school leadership and teachers is evidenced by the new evaluative systems being implemented in numerous states throughout the United States. In

particular, the state of Georgia holds principals and teachers accountable for the academic growth of students through the Leader Keys Effectiveness Systems for principals and Teacher Keys Effectiveness System for teachers (GA DOE, 2016a).

LKES

The expectation for DDDM is embedded within the LKES evaluation system with the establishment of Performance Standard One: Instructional Leadership and Standard Three: Planning and Assessment. Performance Standard One: Instructional Leadership requires that a principal use student achievement data to determine the school's effectiveness and directs school staff to actively analyze data for improving results. Additionally, the principal is required to work collaboratively with the staff to identify needs and to design, revise, and monitor instruction to ensure effective delivery of the required curriculum (GA DOE, 2016e). Performance Standard Three: Planning and Assessments requires the principal to use assessments to inform the school improvement plan, assess and respond to school needs, monitor and evaluate the use of diagnostic assessments, and collaboratively plan and implement a school improvement plan. According to Hartsock (2014) and Jimerson and Wayman (2015), the two evaluation standards for principals mentioned above are significant because it is the principal's role to model the process and establish the procedures for using data to drive instruction in order to contribute to teachers' sense of self-efficacy to analyze data to adapt instruction. Thus, the foundational basis to use data to make decisions on instruction are reflected in the TKES evaluative system as well.

TKES

The TKES evaluative system embeds the expectation of DDDM and an understanding of how to modify instructional practices based upon an assessment cycle. TKES (GA DOE, 2016a)

measures a teacher's effectiveness via the Teacher Assessment on Performance Standards (TAPS). The TAPS that are directly aligned with DDDM are as follows: Performance Standard Four: Differentiation Instruction, Performance Standard Five: Assessment Strategies, and Standard Six: Assessment Uses.

Performance standard four. Performance Standard Four measures differentiated instruction and is the standard that is the impetus for Performance Standards Five and Six due to its reliance on using diagnostic, formative, and summative assessment data to inform instructional modifications for individual students (GA DOE, 2016a). Differentiation requires the implementation of interventions after evaluating administered assessments and using that data to target areas of identified weakness for struggling students and acceleration for those students that excelled on previously administered assessments (Mandinach & Gummer, 2013; Marsh, 2012; Marsh et al., 2015). Differentiated instruction is not solely utilized to improve the student outcomes for underperforming students; differentiated instruction is a systematic process to address the needs of all students through the disaggregation of performance data and the application of qualitative observation to surmise the best instructional approaches to improve student outcomes and teacher quality.

Performance standard five. Performance Standard Five measures teachers' ability to systematically choose assessment strategies and instruments that are valid and appropriate for the content and student population (GA DOE, 2016a). Within the description of the standard, the assumption is made that teachers have a sound understanding of the validity of instruments and that certain instruments are valid contingent upon the content area. The application for teachers is based solely on their ability to choose a variety of assessment techniques and formats to determine a student's level of mastery of taught content. The understanding of the assessment's

purpose leads to using the data from assessments effectively to gauge instruction and align

instructional strategies with improving student outcomes (Lai & McNaughton, 2016).

Performance standard six. Performance Standard Six builds upon the foundation of

Performance Standard Five Assessment strategies. To be a Level III (Proficient) rating on

Standard Six Assessment Uses, the teacher should consistently analyze and use data to measure

student progress, to design appropriate interventions, and to inform long- and short-term

instructional decisions (GA DOE, 2016a). Standard Six encapsulates the vision of using data to

make decisions and to modify or adapt instruction through its emphasis on designing appropriate

interventions and measuring the student performance to ensure mastery of objectives

(Mandinach & Gummer, 2013). For teachers to provide appropriate interventions, the initial

assessment should measure the objectives of the standards and be at the appropriate development

level of the students (Datnow & Hubbard, 2015; Mandinach & Jimerson, 2016). Without

intentionally triangulating assessments strategies, assessment uses, and differentiated instruction,

a teacher will have difficulty maximizing the potential of DDDM and increasing student

outcomes.

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Data-driven Decision-making

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Data-driven decision-making has become one of the main focal points in educational

reform since the passing of the No Child Left Behind Act of 2001. Since the law's passing,

administrators have placed an emphasis on the collection of student data as a means of increasing

student achievement. The idea of using data as a means to drive decisions made by school

districts and administrators is not new. Many school districts use data collected from various

standardized tests that students take to improve curriculum, enhance teacher quality, and share

best practices among schools and districts (Sun et al., 2016). Initially, the DDDM process was

only viewed from district and administration levels (Dunn et al., 2013), but recent educational reform efforts have required classroom teachers and school principals to become proficient at using data to raise student achievement.

<div align="center">**Teachers and Data-driven Decision-making**</div>

One specific purpose of DDDM is to help educators employ better instructional strategies based on accumulated and analyzed student data, which leads to revised teaching choices to facilitate better student learning and improved student outcomes (Sun et al., 2016). This process can involve data from standardized tests to formative assessments that include unit tests, quizzes, science lab reports, homework, and reflections (Mertler, 2007). This aim is theoretically possible, but in practicality, DDDM brings with it various obstacles where teachers are concerned (Blitz & Mulcahy, 2016). Obstacles include how teachers approach and experience the use of DDDM in practice, teachers' perceptions (Datnow & Hubbard, 2016), attitudes toward adoption of DDDM (Mitcham, 2015), and self-efficacy and anxiety related to DDDM (Hoffman, 2010).

Teachers' Experiences Using Data

A critical component of the school environment is the instructional practices and foundational knowledge that underpins the instructional strategies implemented throughout a school. With fidelity at the classroom level, Mandinach and Gummer (2013) asserted that the implementation of DDDM can lead to instructional improvements in the areas of assessment and data utilization, instructional modifications, and curriculum realignment. In addition, DDDM requires teachers to be equipped with the ability to analyse data and understand the correlation of data and observational measurements. The existence of data and the availability of data do not

ensure teachers are using data in a meaningful way to improve student achievement (Wayman, Jimerson, & Cho, 2012).

The effects of working in data teams were explored by Poortman and Schildkamp (2016), who implemented a mixed methods study using data teams to address education problems at the elementary and secondary schools in the Netherlands. Nine data teams in nine schools developed interventions to address student achievement via professional learning. The nine data teams engaged in an eight-step process and the associated activities related to each step that required the teams to systematically collect data, analyze and interpret the data, and use the information gleaned from the data to improve the educational outcomes for students. The outcome of the eight-step process was used to determine the effectiveness of the intervention at the end of one academic year and the evaluation method was determined by the academic problem defined in the first step of the process. Of the nine teams, five of the teams' interventions increased student achievement. Further findings showed the participants became more aware of the importance of increasing data use for accountability, instruction, and school development. Poortman and Schildkamp concluded that the use of professional development related to the area DDDM functioned as barriers or contributors to the effectiveness of data use interventions.

Gelderblom, Schildkamp, Pieters, and Ehren (2016) investigated whether Dutch primary school teachers used data to improve instruction. These researchers sought to understand what data teachers use to adapt their instruction and what role does data use by teachers play in improving their instruction. Through the utilization of a survey instrument that was administered to teachers ($N = 318$) and by conducting teacher interviews ($N = 18$), the findings indicated that teachers understand the importance of making use of data; however, data analyses primarily focused on addressing the learning outcomes of weaker students and not students that were at or

above average performance. A secondary finding was that teachers primarily used data that is classroom-generated from their own students and state standardized assessments but did not typically use student observation to examine their own instructional effectiveness.

DDDM has also been used to evaluate and explore sensitive areas of school system functioning which helped teachers understand what kinds of social issues and obstacles their students had to confront (Blitz & Mulcahy, 2016). When teachers have access to these kind of data, it can assist them in changing certain aspects of the school environment. These changes might result in a more harmonious and conducive learning space for learners.

Teachers' Perceptions, Attitudes, and Adoption of Data-driven Decision-making

Teachers' capacity to use data to inform instruction is at the heart of educational reform (Datnow & Hubbard, 2016). Datnow and Hubbard found that what shaped these beliefs and the capacities to a certain extent was the professional guidance offered in the form of school leaders, consultants and coaches, and involvement in professional learning communities. These forms of guidance can help teachers understand how and why to use data which makes for able and motivated educators (Shoemaker, 2014) to use data to inform instruction. Datnow and Hubbard (2016) also found that professional efforts to enhance teacher capacity were often not adequate to reach goals, thus, leaving teachers with a lack of knowledge and skill which lead to mixed beliefs about data use.

Jimerson (2014) reported that educators approached DDDM from an array of mental models for data use, and that these models seemed to be based in ways of thinking about "data" and "data use" that were impacted by training, modeling by leaders, teachers' social interaction with colleagues, and personal experience. Mitcham (2015) explored the effects of teacher attitude on the capacity to use data and found that teachers' attitudes correlated significantly with

student outcomes; teachers' attitudes influenced their capacity for data use in either a negative or a positive way. Mitcham concluded that teachers' attitudes could directly impact teacher instruction which in turn affects student achievement. An example of what positive attitudes towards DDDM may be able to do for student outcome can be seen in the study of Staman et al. (2014). These researchers found that a positive attitude towards DDDM brought about positive outcomes. Staman et al. determined that what played a significant role for the teachers was that professional development plans that were at play and were the major influencer of teachers' attitude towards DDDM. This would suggest that when teachers felt they had the necessary knowledge and skills to work with DDDM, they automatically had a positive attitude towards it.

On the other hand, some teachers lack the self-assurance and/or the skills and knowledge needed to correctly engage with and interpret data which negatively affected the educators' attitude towards data use. This is especially prevalent in early career teachers and those just entering the field. Hartsock (2014) developed a study to identify what young teachers themselves perceived as factors that impacted their data use endeavors. The outcomes revealed four broad conclusions: (a) training in data use is vital; (b) beginner teachers perceived incongruity between the use of data and their teaching; (c) DDDM perceptions of beginner teachers were considerably influenced by the school's underlying culture; and, (d) leadership from principals was perceived to be imperative for meaningful data use. Hartsock further found that novice teachers displayed high levels of anxiety regarding data use as compared to in-service teachers. Subsequently, Dunlap and Piro (2016) posited that in order for novice teachers to be successful in the use of data, they must possess, understand, and effectively use data skills—something very difficult to accomplish without proper training.

The influence of a successful school leader can also significantly impact the perception DDDM practices of his or her school. Hoppey and McLeskey (2013) studied one principal with a reputation of high success levels in promoting positive school change and creating a model inclusive program in his school. These researchers sought to understand what actions this principal took to attain such positive results. Their findings indicated that the principal identified his function as a facilitator to his staff's functioning or supporting teachers for them to deliver their best work possible. The principal fulfilled this function by caring for and nurturing his staff as much as possible, protecting them from the external pressures that come with high-stakes accountability, making available high-quality professional development programs, and making sure that his teachers had ample opportunity to assume leadership roles in his school. It can be seen from the results of this study that a principal who has fully equipped himself or herself will be a positive and capable primary instructional leader. The principal makes sure the staff is adequately trained and able to deal with any and all of their responsibilities as an educator, which includes data use and DDDM processes.

The attitudes and beliefs of teachers can also affect their adoption of DDDM practices. Dunn et al. (2013) aimed to identify what variable influenced teacher adoption of DDDM practices. They found that different levels of professional development influence teacher data use. The same was found to be true in the study of Staman et al. (2014). The University of Twente in the Netherlands developed a training course whereby school teams learned to use data from a computerized monitoring system to improve instructional quality and student performance. The effects of this training were monitored. Staman et al. found that these course training activities had a positive effect on the teams' DDDM skills and DDDM knowledge. When teachers had the needed tools for practicing DDDM, their reluctance to adopt is lessened.

Teacher Self-efficacy and Anxiety Relating to Data-driven Decision-making

  Petrilli (2013) offered that a teacher's self-efficacy is the teacher's self-assessment of his or her own ability to support student learning and to bring about positive student outcomes. This sense of self-efficacy has a direct influence of a teacher's levels of anxiety when it comes to data use. According to Hoffman (2010), teachers' sense of self-efficacy and their levels of anxiety regarding data use play a pivotal role in how they go about using data. These aspects most frequently determine how successful or unsuccessful DDDM practices are in improving student achievement.

  Hoffman (2010) investigated the role of self-efficacy beliefs, mathematics anxiety, and working memory capacity in problem-solving precision, reaction time, and efficiency. Hoffman found that a strong belief in self-efficacy significantly helped when it came to efficiency outcomes regarding mathematics amongst the novice teacher participants in his study. Hoffman further found that self-efficacy played a distinctive role when it came to reaction time as well as efficiency. Teachers that did not know how to intemperate and use data hesitated in using it to inform instruction. This hesitation most likely sprouts out of a lack of confidence. If teachers suffer from a lack of confidence regarding self-efficacy, it likely causes elevated levels of anxiety, leading to either the lack of data use or ineffective data use. Similarly, Datnow and Hubbard (2016) observed the same findings among teachers who felt they lacked the needed abilities to use data. These feelings of inadequacy caused the teachers to experience high levels of anxiety in their endeavors to use data successfully to improve student outcomes.

  Charalambous and Philippou (2010) studied the link between teachers' concerns and self-efficacy beliefs regarding the implementation of a new math curriculum and using data to determine the effect from implementing a new math curriculum. The study included 151

elementary mathematics teachers who were 5 years into the mandated mathematics curriculum reform. The findings corroborated that there are significant associations between teachers' self-efficacy to use data effectively and their levels of anxiety, particularly during a period of math reform. The findings further suggest that self-efficacy is a major contributing factor in whether DDDM practices are implemented with competence.

Other factors contribute to high levels of teacher anxiety. The ongoing growth of available data was one of them (Mullins & Sabherwal, 2014). Mullins and Sabherwal found that higher and higher loads of data had a curvilinear relationship with quality decision-making. In some cases, teachers felt overwhelmed by the immense amount of work that these data brought to the DDDM process. Another cause for high levels of teacher anxiety was the feeling of discouragement. Student success or a lack thereof had a significant influence on teachers. Pedota (2015) posited that a lack of student success may become a determining factor when teachers decide whether to remain a teacher or not based on their self-evaluated ability to bring about positive learning outcomes through DDDM practices. Teachers with high levels of DDDM anxiety are likely to want to give up as teachers because they may feel they are not able to inform instruction through DDDM properly and are therefore incompetent teachers.

Investigating an area of research interest and focusing on teachers' sense of self-efficacy and their levels of anxiety regarding data use, Dunn et al. (2013) evaluated the effect of using data to inform instruction on teachers' self-efficacy. The researchers found that teachers displayed concerns and reluctance to engage with DDDM. They concluded that low levels of skill and knowledge regarding the proper use of DDDM was prevalent when teachers were not fully equipped with the necessary knowledge and skill for DDDM use, which directly impacted their levels of self-efficacy and anxiety. Dunn et al. further stated that teachers' sense of self-

efficacy for the abilities that support classroom-level DDDM and DDDM anxiety considerably affected teachers' DDDM self-efficacy, which impacted collaboration concerns. As an effect of lower levels of perceived self-efficacy and high levels of anxiety, preservice teachers were defiant towards learning more about DDDM because they believed they knew of better innovations to use to improve student learning and were unlikely to use DDDM in their future classrooms (Dunn et al., 2013). Ford, Van Sickle, Clark, Fazio-Brunson, and Schween (2015) similarly asserted that the teachers in their study were reluctant to make instructional decisions based on data due to perceived low levels of self-efficacy and too little support in the form of self-efficacy development experiences. The teachers felt that if they were expected to use data to inform instruction, then their self-efficacy needed attention.

In a study conducted by White (2014), the researcher's aim was to explore to what extent the teachers of the Maple Hill School District's three elementary schools comprehended teacher self-efficacy and to which degree teacher self-efficacy behaviors were practiced by the educators in the Maple Hill School District. Furthermore, White aimed to examine the effects on teacher self-efficacy when the district provided professional development programs. The findings suggested that due to professional development, the teachers possessed a strong understanding of teacher self-efficacy, and that they did exercise self-efficacy behaviors that could be related to improving the learning and teaching process (White, 2014). The findings also showed that the inclusion of teacher self-efficacy was an important aspect to be addressed and continued professional development programs were needed in the Maple Hill School District (White, 2014). Staman et al. (2014) also showed that the only way to curb reluctance toward DDDM use was to engage teachers in professional development and training to help them feel more confident, skilled, and knowledgeable DDDM users. The subject of teachers' ability to use data,

however, also points to their instructional leaders who are expected to be capable DDDM users themselves and that should make provisions for their staff to be trained in proper data use. Together with adequate professional development plans, researchers have highlighted collaboration as a means of alleviating anxiety and promoting a positive sense of self-efficacy (Van Gasse, Vanlommel, Vanhoof, & Van Petegem, 2017).

A review of the literature indicated there are many factors that determine the successful, unsuccessful, or non-use of DDDM practices. Teachers' perceptions, attitudes, and adoption of DDDM (Datnow & Hubbard, 2016) and teachers' DDDM self-efficacy and anxiety (Dunn et al., 2013) all play a role. Researchers have shown that teachers lack the basic skills and understanding to interpret and analyze data for the development of instructional strategies based on data and in implementing instructional strategies at the classroom level to address the shortcomings reflected through data analysis results. The review of literature identified professional development as a critical part of raising teacher self-efficacy and lowering a teacher anxiety as it relates to their DDDM endeavours.

Principals and Data-driven Decision-making

While the emphasis on data as a driver of reform has been a cornerstone of American business practices, the combination of federal and state mandates pushed the use of DDDM to the forefront of thought for district and school level administrators. The rationale was to hold schools accountable for raising student achievement outcomes and close the achievement gap between differing socioeconomic levels, racial demographics, and exceptionalities of students. The paradigm shift of principals from managers to instructional leaders can be attributed to NCLB (2001), RT3 (2010), and ESSA (2015). The continuous reform of educational laws to include data as a defining component of success reaffirms the belief that data-driven reforms can

improve student outcome and inform teacher instructional practices (Petrides, 2006). Because school principals play a vital role in the use of DDDM and in leading their staff in their data use practices, it is vital to examine the role of the principal regarding DDDM (Reeves et al., 2016; Sergis & Sampson, 2016) and principals' capacity for DDDM use (Heilig, 2014; Hostiuck, 2015; Murray, 2013; Perry, 2013; Smith, 2014).

The Role of the Principal and Data-driven Decision-making Capacity

The microscopic analysis of school performance against state and federal benchmarks led to newfound expectations of school principals. School principals must now provide evidence to support their decisions and are now required to develop school improvement plans based on data; the data from test scores were used as a tool to plan the next steps in improving student outcomes (Petrides, 2006). In conjunction, the data received from state and local sources must be used to support and monitor change, to influence instructional initiatives within a school or district, and to be used as a cornerstone of triangulation for quantitative, qualitative, and observational data. Principals and district-level administrators became responsible for basing decisions on data, not merely their intuitive senses. The duty of improving student achievement has moved from being solely district-led initiatives into becoming school-based initiatives with the principal as the primary decision-maker and instructional leader (Reeves et al., 2016). To effectively implement DDDM and cultivate a DDDM culture, the principal should exhibit the characteristics of an instructional leader. The principal can do this by managing the instructional program and creating structures that support the integration of classroom level DDDM (White, 2014).

Considering that principals have to deal with the intense complexity of collecting and sorting through institution-wide data towards the generation of feedback loops and the array of tasks that school leaders are required to be a part of, it is easy to see that they have an immense

amount of responsibility on their shoulders (Sergis & Sampson, 2016). As the primary decision-maker, the principal must also take into account that teachers, students, parents, and data management systems are some of the complex interrelating factors found in the adaptive systems that make up their schools (Sergis & Sampson, 2016). When designing a strategic plan or making instructional choices for their schools, school leaders should consider the full spectrum of characteristics and behaviors of these agents, as well as the intricate ways in which they interrelate and affect the whole school's performance and environment (Sergis & Sampson, 2016).

Principals' Capacity for Data Use

Researchers have often studied principals' ability for data use because principals are responsible for leading their staff at the instructional decision-making levels. Perry (2013) conducted a study to evaluate educational leadership and principal assessment literacy. Perry administered a survey designed to test principals' level of assessment literacy called Classroom Assessment Literacy Inventory (CALI). Perry asked principals to have two teachers from their school that taught English, science, or mathematics to also take the same CALI. The results showed that principals had scores lower than that of classroom teachers, indicating that the assessment literacy of principals were low.

Murray (2013) offered that school systems have access to more data than ever before, but most school leaders lack the skills to use the data for student and school improvement. Current attempts to use data have no depth and have been focused more on meeting state and federal requirements and accountability than exploring the influences that support and hinder the teaching and learning process (Murray, 2013). This may point to a need for principals to engage in more training or professional development programs in order to become efficient school

leaders. Heilig (2014) echoed this point, stating that when principals are offered professional development, there is a positive reaction regarding DDDM practices and school improvement. Smith (2014) posited that the state and the federal government should also find new ways to disperse and relieve some of the pressures on principals around state and federal accountabilities as this heavily affected principals' capacity to use data to achieve positive student outcomes.

It is logical to assume that principals who are not fully equipped to bring about positive school improvement through the use of data can usually be found as leaders of staff who are not able to practice proper data use practices (Heilig, 2014). As in the case of teachers, the need for professional development programs was also identified for principals and other forms of instructional leadership. These programs install the needed skills and impart important knowledge that may help in the process of using DDDM.

Professional Development and DDDM

As the current researcher has established, the lack of professional development is one of the main factors that inhibits teachers' beliefs, attitudes, and sense of self-efficacy and anxiety when it comes to DDDM in practice. The lack of professional learning leaves teachers and principals with low DDDM self-efficacy and high anxiety levels when it comes to data use, accomplishing the exact opposite to what DDDM was designed for, raising student achievement (Park, 2008). Researchers have shown that proper training in DDDM through professional learning communities and coaches (Marsh et al., 2015), sustainable professional learning (Ezzani, 2015), and collaboration (Betts, 2014) means more successful implementation of DDDM.

Professional Learning Communities

The combination of professional learning communities (PLC) and coaches can help

teachers navigate their response to DDDM (Marsh et al., 2015). Real professional learning is about making changes to teachers' thoughts and practices (Katz & Dack, 2014). Marsh et al. (2015) found that teachers more easily made use of data to change instructional delivery beyond the surface-level alterations after receiving training through PLCs and coaches. Moreover, Marsh et al. posited that dialogue and the relationship between two types of expertise may assist with explaining the ways in which coaches and PLCs seemed to ease the process of deeper-level changes in teaching practice. Arthurs (2014) investigated what significant characteristics do coaches need in order to assist classroom teachers to apply DDDM principles in their classroom. This investigator's findings indicated that the coaches in his study had key attributes that made them 'effective' in their support to teachers with DDDM that included strong educational and content expertise, which helped them gain the respect of teachers; strong interpersonal skills, which aided them in building trusting relationships; and a strong faith in the capacity of others to grow and develop, which helped them to develop self-efficacy. Additionally, Arthurs examined how DDDM coaching promoted teacher data use. The examination presented results that indicated coaching advanced teacher knowledge and skills in a positive way and caused an improved sense of self-efficacy. Arthurs also reported that coach support did not have a significant impact on teaching practice.

Sustainable Professional Learning

If there is an absence of professional development, it hampers teachers' efforts to use data and reduces their confidence in doing so (Datnow & Hubbard, 2015). Ezzani (2015) aimed to understand the relationship between the application of sustainable professional learning to DDDM. Focusing on multiple school districts that implemented professional development for their teachers and DDDM use, the findings showed that sustained maintenance of professional

learning in DDDM, using specific structures and processes were vital for how reform in districts took place to attain better student outcomes. Similarly, Hoogland et al. (2016) aimed to identify what the prerequisites for successful implementation of DDDM were and found that a very important aspect of effective DDDM use was that teachers were provided continuing professional development opportunities to add to their knowledge and skills when it comes to classroom DDDM. Niemeyer (2012) found similar results when trying to understand the influence of in-service training on educator perceptions concerning the use of DDDM in schools to guide instructional practice. The participants of this study took part in a 90-minute professional development training program that focused on integrating DDDM into instructional practice. The results indicated that the training had a significant impact on educator perceptions of DDDM. Furthermore, participants endorsed the training as useful and effective (Niemeyer, 2012). In yet another study, Johnson (2015) examined the effects of professional development on DDDM practices. The outcome suggested that teachers displayed a significant increase in their perceived ability to analyze and use data to inform classroom instruction after taking part in a professional development program.

Collaboration

The aspect of collaboration with coaching support plays an integral part in translating professional development into more effective practices in the classroom. Betts (2014) found that when the coach collaborates with teachers, the effects are positive on data use to improve instruction. Betts reported that teachers wanted their literacy coaches to spend time on planning and collaborating and the findings showed that the lack of enough time spent together was an obstacle which prevented effective collaboration between the coach and teacher. The coaches and teachers acknowledged that the provision of resources, lesson planning, coaching phases,

smaller group instruction, and professional development were vital factors in the implementation of effective collaboration and coaching in data literacy (Betts, 2014). The coaches and teachers were reported to feel that when collaboration was effective between the coach and teacher, they would improve as educators and continue the growth and encouragement of future teachers (Betts, 2014).

Datnow, Park, and Kennedy-Lewis (2013) found that both teacher collaboration and DDDM use were vital components that play a role in the school improvement process. According to Datnow et al., teacher-coach collaborations are effective because coaches possess important traits which make them valuable in their support to teachers about the DDDM use. Some of the characteristics that Datnow et al. identified included strong content expertise and pedagogical skill, sound interpersonal skills, and a strong faith in the ability of others to grow and develop. According to Arthurs (2014), another benefit of collaboration is that it helps teachers feel supported when it comes to the pressures that accountability places on them. Coaches may be seen by teachers as a sort of safety net in the process of guidance towards reaching expected state and federally imposed accountability standards.

Regarding principals and professional development, the case of the successful principal in Hoppey and McLeskey's (2013) study serves as a blueprint of how a school leader could be "lubricating the human machinery." For school leaders to function optimally, the onus lies on the authorities above school level leadership to provide sufficient professional development programs. The provision of professional development programs will possibly alter teachers' perception of instructional leadership in a positive way and will ultimately lead to skilled educators who trust and respect their leader (Loudermilk, 2015). This in turn may positively

affect the use of DDDM practices for instructional decision-making at the classroom level to bring about enhanced student achievement.

In summary, professional development that instills the required skills and knowledge regarding data use was found to be of great importance (Marsh et al., 2015). Problems experienced by teachers without the necessary skills and knowledge also play a role in determining teachers' sense of self-efficacy, inhibiting them from making changes in instruction for equitable improvement in student achievement. This may also lead to higher DDDM anxiety, which can lead to drained motivation to continue in the teaching profession (Ford et al., 2015). Teachers' capacity to use data and their beliefs about DDDM were formed inside their professional communities, in training groups sessions, and in their dealings with coaches and principals (Datnow & Hubbard, 2016). Professional development for teachers and school leaders is the key to solving data use problems.

Professional development can take place through the use of professional learning communities where coaches who possess key attributes are effective in their support to teachers (Marsh et al., 2015). Under sustainable professional learning, scholars have concluded that the continued use specific structures and processes were vital in helping teachers bring about better student outcomes through DDDM use (Ezzani, 2015). Finally, collaboration also played a vital role when it came to coaches training, working with, and supporting teachers in their data use endeavors (Betts, 2014).

DDDM at Different School Levels

The aim of DDDM is to close the achievement gap that existed in student outcomes. Initially, the DDDM process was only viewed from a district and administration levels (Dunn et al., 2013). The duty of improving student achievement then moved from being solely district-led

initiatives into becoming school-based initiatives with the principal as the primary decision-maker and instructional leader and teachers as the primary instructional decision-makers at the classroom level (Reeves et al., 2016). In this section, the researcher will examine the effect of DDDM at different school levels through of relevant literature. In alignment with the third research question, the different school levels include elementary and secondary schools.

Elementary Schools

In a study by Gelderblom et al. (2016), the researchers examined the use of data to improve instruction with Dutch primary school teachers. Four different aspects of instruction were singled out: purposeful teaching, adaptive instruction, feedback, and learning time. A survey was given to 318 participants and 18 teachers were interviewed. The study results indicated that while most teachers used data with the intent to improve instruction, they skipped vital steps in the DDDM process. They failed to make the best use of on-hand data and did not perform all applicable analyses. Teachers were found to only use data when their learners achieved substandard outcomes (Gelderblom et al., 2016).

Evans (2015) explored how educators used DDDM at Greenbrook Primary School and what factors may or may not inhibit the proper use of data. Evans examined teacher engagement with color-coded student performance data. Seeing that the color-coding of data was meant to support teachers' interpretations of data, Evans argued that students' color-coded data were mainly used to sort students into different educational offerings. This scholar found that teachers were often passive recipients of data and mandates on how to analyze and use data. Furthermore, Evans found that there were various political mandates that governed teachers' work at Greenbrook. Evans argued that teachers had very little independence and freedom to respond to students' data in meaningful ways.

Hubbard, Datnow, and Pruyn (2014) explored the promise and pitfalls of implementing data use. In their article, the researchers report findings from a year-long case study of a U.S. elementary school that placed data use at the core of its platform for school reform. The goal of the study was to determine how teachers implemented data to use in concert with other reform initiatives. Interviews with educators, as well as observations of teacher team meetings, revealed that policies and structures at school, district and federal levels affected how and when teachers used data. For example, Hubbard et al. found that teachers mainly used data to inform instruction in certain subjects and not at all in others. As a result, the researchers concluded that this might have caused a lowered student grade point average in some subject areas because the use of relevant data could have helped to improve performance in those curricular areas. These researchers' further investigation also revealed that the requirements to implement DDDM initiatives along with other reform initiatives caused many anxieties that reduced teachers' motivation and ability for data use (Hubbard et al., 2014).

Using a qualitative approach, Hartsock (2014) aimed to investigate teachers' perceptions regarding DDDM. These researchers studied four beginner teachers, each from different elementary schools in Pennsylvania, over a period of 6 months. Some of the perceptions that were found to influence the teachers' use of data were the perceived incongruity between the use of data and instruction; teachers' perceptions of DDDM were considerably influenced by the school's underlying culture and leadership from principals that were perceived to be imperative for meaningful data use. Datnow and Hubbard (2016) concluded that the best way towards improving teacher capacity and motivation for data use were found in professional communities and in their dealings with coaches and principals. The use of professional development, as seen throughout the body of literature, made a significant difference in teacher capacity, motivation,

self-efficacy, and anxiety in terms of DDDM practices (Ezzani, 2015; Johnson, 2015; Marsh et al., 2015).

In instances where DDDM practices were correctly used, the student outcomes were considerably influenced. Van Geel, Keuning, Visscher, and Fox (2016) examined how DDDM affected the academic outcomes of 53 elementary schools. The researchers used linear mixed models to analyze the differential effect of data use on student achievement. The final results revealed that the 2-year data-based decision-making intervention significantly improved student performance, especially in low socioeconomic status schools (Van Geel et al., 2016). Additionally, Abbott and Wren (2016) examined how teachers used data-driven instruction planning as a valuable tool for optimizing student learning. These scholars described how teachers were actively using formal data-informed practices within professional learning communities. The teachers employed a locally-developed performance task (LDPT) to measure critical thinking, problem-solving, and written communication skills of elementary and middle school students (Abbott & Wren, 2016). The results indicated that teachers engaged in formal data-informed practices within professional learning communities and actually examined student work samples in order to plan instruction based on student-specific needs (Abbott & Wren, 2016).

Secondary Schools

Datnow, Park, and Kennedy-Lewis (2012) explored how high school teachers used data to make instructional choices inside the work and policy contexts. Using a framework that drew upon sense-making and co-construction theories on reform implementation, the researchers analyzed qualitative data gathered from four urban public high schools in the United States. The results shed light on how complex and multilayered the processes of teacher data use were. The

findings also illuminated how data were influenced by teachers' social interactions (e.g., professional communities) and interpretations (Datnow et al., 2012). Many different forms of data were used to inform decision-making and many struggled with reconciling policies promoting DDDM with local practices and beliefs (Datnow et al., 2012). The policies and structures at school, district, and federal levels affected how and when teachers used data (Hubbard et al., 2014).

In a study conducted by Park (2008), the researcher's aim was to understand how high school teachers in two urban schools perceived and used data for school improvement. Using a case study research design, the researcher examined how high school educators from two urban schools see and use data for school development. The results of the analysis of interviews, observations, documents, and teacher surveys indicated teachers' attempts to understand DDDM were clarified by how they approached data theoretically, their reasons for using data, and the results they expected from using data (Park, 2008). There were different ways that teachers oriented their DDDM practices. These orientations included an inquiry-centered, solution-centered, bureaucratic-centered, or compliance-centered orientation. Another part of Park's findings indicated that teachers' attempts to understand DDDM were mediated by accountability, district, and departmental contexts. Park found that policy enforcement was ultimately a distributive process, where different types of contexts play different roles in how teachers make sense of and use data. Structures and norm on the departmental level about sharing data, as well as the measure of collaborations, affected the extent to which teachers used data to inform instructional practices.

Kressler (2014) sought to understand the perceptions of high school teachers with regard to DDDM when used to improve the academic achievement of under performing students.

Kressler used a qualitative approach to analyze data obtained from interviews and field observations. Kressler identified, among other themes, that there was a definite need for teacher training through professional development (Kressler, 2014). The participants in the study also displayed a need for support through professional communities and a facilitated understanding of data use practices that can be acquired from these communities.

 Goodwin (2015) pinpointed how the role of dean at a Texas high school supported DDDM and changes in teaching practices. The understanding and perceptions of a district leader, principal, assistant principals, academic dean, department chairs, and teachers were gathered individually and through focus group interviews (Goodwin, 2015). These findings mainly illuminated aspects such as: data analysis activity types, provision of a data climate and culture, challenges encountered with data analysis activities by the academic dean, using cognitive coaching to promote a climate of trust, and instructional capacity support through clinical coaching (Goodwin, 2015).

In summary, there were not any significant differences in the experience of DDDM at elementary or secondary school levels. Teachers in both school levels exhibited struggles with data use because of a lack of knowledge or skills; the teachers required professional development programs to address these shortcomings (Datnow et al., 2012; Gelderblom et al., 2016). On the other hand, educators that made use of data on elementary school and high school levels displayed significantly positive differences in teacher capacity, beliefs, attitude, DDDM adoption, motivation, DDDM self-efficacy, and DDDM anxiety when professional development was utilized (Ezzani, 2015; Johnson, 2015; Marsh et al., 2015).

State and Federal Influence on DDDM Practices

State and federally mandated accountability, standard-based transformation, classroom

 level data use, data interpretation, and teachers' perception of DDDM have put considerable amounts of pressure on educators (Farrell, 2014; Killion, 2009). Because talk about data-driven practice has become abundant in education, and with the transition from the No Child Left Behind Act (Pub. L. No. 107–110) and legislative passage of the Every Student Succeeds Act, teachers in the United States should expect even more calls for formalized data use (Jimerson, 2016). According to Smith (2014), administrators' jobs continue to grow in complexity as external directives continue to dictate schools' internal issues, and as the public continues to require increased accountability. In this section of the review, the researcher will explore how state and federal influences impact DDDM practices.

Ford et al. (2015) studied the effect of a teacher evaluation system (*Compass*) in Louisiana to understand how *Compass* molded teachers' motivation for instructional improvement through data use and their commitment to the teaching profession. The study was conducted with 37 elementary teachers from five different districts across Louisiana after their first 2 years of using the *Compass* system. The results of the researchers' analysis of longitudinal interview data that centered on teacher support to use data, teacher self-efficacy to use data, and overall job satisfaction, showed a general lack of support in the form of teacher self-efficacy building experiences (Ford et al., 2015). Because of this, many teachers experienced significant negative experiences and profound losses of satisfaction and commitment to the profession by their second year; this was despite the fact that most of the teachers had received ratings of "highly effective" on the *Compass* teacher evaluation system (Ford et al., 2015).

Reichardt (2000) explicated that state policies and programs could facilitate and encourage the use of data in decision-making at the district and school levels by (a) creating policy structures to support and encourage DDDM, (b) providing data, and (c) providing

professional development to increase teacher capacity for data use. Various scholars (Arthurs, 2014; Hubbard et al., 2014) have concurred that due to the pressure to use data for school and student improvement, federal and local policymakers should offer professional development for teachers, teacher leaders, and instructional coaches.

On another level, state and federally-mandated accountability can cause so much stress for educators that they entirely miss the point of DDDM. Hostiuck (2015) conducted a study to investigate and understand how principals use school climate data when creating School Improvement Plans (SIPs) and engaging in the DDDM process. The outcomes of the study suggested that principals not only did not know how to use the school climate data to develop school improvement plans, but they also neglected to use school data because they would rather focus on using data sets related to state and federal school improvement mandates measured by Adequate Yearly Progress standards. Hostiuck concluded that the principals were under much pressure to meet the accountability standards, driven by the fear of getting a low score on the AYP. In conjunction, Murray (2013) posited that attempts to use data are deficient in depth and have been more focused on accountability and meeting state and federal obligations than on thoroughly investigating the aspects that support and obstruct the teaching and learning process. As a result, the potential advantages of data use have not been fulfilled or even comprehended (Murray, 2013).

As can be seen from the relevant literature, state and federal influences can either be conducive or detrimental to the DDDM process. On the one hand, the state and federal authorities should make available professional development programs because when they do there was a positive reaction regarding DDDM practices. They should find ways to relieve pressure on educators around state and federal accountabilities (Smith, 2014). This will give

educators the chance to focus on the responsibility of informing instruction through DDDM

practice to achieve the original goal of DDDM, which was to enhance student achievement.

DDDM and Technology

Like professional development programs that can equip educators to make the processes

of using DDDM much easier and more productive, some researchers have studied how

technology can be of assistance in this regard. Schifter, Natarajan, Ketelhut, and Kirchgessner

(2014) presented an approach used in a National Science Foundation (NSF) funded project to

assist middle-grade science teachers in using elaborate and diverse data from virtual environment

game modules created for assessment of science inquiry. The NSF-funded project dashboard was

proposed, along with findings that indicated real promise for a model used to train teachers in

using data from the dashboard and DDDM principles, to identify and understand science

misunderstandings, and to utilize the data to design instructional options to address those

misunderstandings (Schifter et al., 2014).

The issues that arise from technological approaches to DDDM are that more training is

needed to teach educators how to use the certain platform in their data use practice. Swan and

Mazur (2011) presented an article that reported on an exploratory study of preservice teachers

who made use of a web-based online tool created to collect and display student data. The main

purpose of the data on this tool was to facilitate *just-in-time* formative assessment for

instructional decision-making (Swan & Mazur, 2011). The findings highlighted the obstacles to

implementing DDDM in real classroom practice—a convergence of curriculum policy as well as

technology and teacher heuristics that result in differences in data interpretation that involve

concerns with both skill and perspective-taking on the data sets (Swan & Mazur, 2011). Another

limitation that exists in using technology for data use practices may be that a large amount of

data can be collected during a learning session, but the social dynamics that characterize the

context in which learning takes place may not be understood through a technology approach

(Fulantelli, Taibi, & Arrigo, 2015).

Tools of a technological nature could significantly support educators in their DDDM

practice and instructional decision-making endeavors (Schifter et al., 2014). Technology may

help the busy principal collect and analyze data, which would lift the burden of having to do it

manually, affording him/her more time to spend on implementing required changes, as identified

through data. The purpose of such tools is to alleviate any unnecessary pressure and stress;

pressures that may come from various levels, such as state and federal accountabilities, in-school

responsibility, or classroom performance expectations. These are all aspects that weigh down on

teachers and school leaders in their attempts to bring about enhanced student achievement

through data use practices.

The issues that may arise from technological approaches to DDDM were that more

training would be needed to teach educators how to use certain platforms in their data use

practice (Swan & Mazur, 2011). In addition, another limitation for intregrating technology

useage for DDDM purposes was that technology does not account for or incorporate the organic

aspects of learning as it takes place in the classroom context (Fulantelli et al., 2015).

Chapter Summary

Through this literature review, the researcher illustrated that DDDM has become one of

the main focal points in educational reform since the passing of the No Child Left Behind Act in

2001. The purpose of DDDM is to help educators employ better instructional strategies based on

accumulated and analyzed student data, which will lead to revised teaching choices that facilitate

better student learning and improved student outcomes (Sun et al., 2016). Teacher beliefs,

attitudes about, and the capacity for data use were discussed as being at the center of the connection between instructional change and data (Datnow & Hubbard, 2016). Mitcham (2015) found that teachers' beliefs and attitudes correlated significantly with student outcomes. Datnow and Hubbard (2016) found that what shaped these beliefs, attitudes, and the capacities for using data to a certain extent was the involvement in professional learning communities.. These communities have been found to help educators understand how to use data which makes for able and motivated educators (Shoemaker, 2014). The problem has been that efforts to enhance teacher capacity to use data were often inadequate in improving teaching practices, thus, leaving teachers with a lack of skill and mixed beliefs about data use (Datnow & Hubbard, 2016). Teacher beliefs about DDDM, attitudes toward DDDM, reasons for adopting DDDM, DDDM self-efficacy, and DDDM anxiety all play a significant role in effective data use.

In terms of principals, the researcher discussed how they should effectively implement DDDM and cultivate a DDDM culture. The principal should exhibit the characteristics of an instructional leader by managing the instructional program and creating structures that support the integration of classroom level DDDM (White, 2014). Professional development was identified as one of the main factors that could solve a great deal of problems when it comes to DDDM in practice. The lack of professional learning leaves teachers and principals with low DDDM self-efficacy and high anxiety levels when it comes to data use. When professional development was utilized to enhance teacher skills and knowledge, educators displayed a significant increase in their perceived ability to analyze and use data to inform classroom instruction (Johnson, 2015).

The effects of DDDM at different school levels were also discussed. The literature suggested that on both elementary and high school levels, the effects were virtually the same.

Elementary and high school teachers exhibited struggles with data use because of a lack of knowledge or skills and, therefore, needed professional development programs to address these shortcomings (Datnow et al., 2012; Gelderblom et al., 2016). The perceptions of a school leader were influenced by how successful he or she was at being a facilitator of staff functions or how well he or she supported teachers and protecting them from the external pressures that come with high-stakes accountability (Hoppey & McLeskey, 2013). When principals were not equipped to function as the leaders they should be (Perry, 2013), the perceptions of teachers toward those principals were negatively impacted. Finally, the researcher discussed technology as it relates to DDDM. First, the researcher found that the use of technology to assist teachers in their DDDM endeavors shows real promise for data use practices and enhanced teachers' sense of self-efficacy (Schifter et al., 2014). This, however, comes with its own set of professional development challenges.

CHAPTER 3

METHODOLOGY

The purpose of this study was to ascertain the relationship between teachers' perception of data-driven instructional leadership and their sense of self-efficacy and anxiety for data-driven decision-making. Additionally, the research study examined if teachers' school level (elementary or secondary) influenced their perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. For this research, the researcher defined data-driven instructional leadership as the leadership practices that are effective in promoting data use in schools as a way to improve student learning via data-based goal setting, developing teachers' decision-making capacity, building a data-wise culture, and improving instruction based on data (Sun et al., 2016). The researcher defined teacher sense of self-efficacy for DDDM as teachers' beliefs about their abilities to successfully engage in classroom level DDDM (Dunn et al., 2011); self-efficacy beliefs are essential determinants in the acquisition of new knowledge and applying that new knowledge to differing context (Bandura, 1997). Teacher anxiety is an inverse indicator of self-efficacy (Aydin, Uzuntiryaki, & Demirdogen, 2011). The researcher defined DDDM anxiety as the worry, tension, and apprehension that teachers feel about engaging in DDDM (Dunn et al., 2011). Researchers have not yet investigated teacher self-efficiency and teacher anxiety simultaneously concerning data-driven decision-making; subsequently, the results of this study were essential to deepening the literature regarding DDDM beyond the system level and helping instructional leaders understand how to best support teachers to be data-driven and redefine their leadership style. According to Kerr et al. (2006), improving DDDM at the classroom level is a critical component of the school improvement process. Administrators are expected to close the achievement gap between the

highest and lowest performers in their schools; however, this cannot occur without teachers utilizing DDDM. The current researcher utilized a correlational research design to examine the relationship between teachers' perceptions of data-driven instructional leadership and teacher self-efficacy and anxiety regarding data-driven decision-making at the elementary and secondary levels.

The researcher begins this chapter with a review of the research questions, followed by a discussion of the research design as well as the operational variables. The researcher continues with a discussion of the population identified for the research study, the instrumentation, and the processes for data collection and data analysis. The researcher concludes the chapter with a summary discussion.

Research Questions

To maximize the potential of DDDM, administrators must assess the barriers inhibiting teachers from adopting DDDM to improve student achievement, adopt research-based instructional practices, and differentiate instruction (Datnow & Hubbard, 2015; Schildkamp et al., 2014). The adoption of DDDM cannot occur without first calling on principals to identify and raise the sense of self-efficacy and decrease anxiety of each teacher concerning DDDM, as well as to ascertain the principal's leadership practices that influence the adoption of DDDM (Levin & Datnow, 2012). In order to improve the educational outcomes for all students, all faculty, including a school's principal, must have a stake in student achievement.

Based on the literature reviewed, the theoretical framework, and the researcher's own interest, the researcher developed the following research questions:

1. What are teachers' perceptions regarding data-driven instructional leadership?

2. What are teachers' self-reported self-efficacy and anxiety regarding DDDM?

3. What is the relationship between teachers' perceptions of data-driven instructional leadership, school level (elementary and secondary), and teacher sense of self-efficacy and anxiety for data-driven decision-making?

Research Design

The researcher utilized a correlational research design to examine the relationship between teachers' perception of data-driven instructional leadership and teacher sense of self-efficacy and anxiety for data-driven decision-making. Additionally, the researcher utilized a correlational design to determine whether there was a difference in the relationship between teachers' perceptions of data-driven instructional leadership and DDDM self-efficacy and DDDM anxiety at the elementary and secondary levels. A correlational research design utilizes correlational statistics to describe and measure the relationship between two or more variables for a set of scores (Creswell, 2012). The three major variables in this correlational study were teacher sense of self-efficacy for DDDM, teacher anxiety for DDDM, and teachers' perceptions of data-driven instructional leadership. Data-driven instructional leadership was the predictor variable, and sense of self-efficacy and anxiety for DDDM were the criterion variables. School level (elementary or secondary) was also used as a control variable.

The rationale for a non-experimental quantitative research method selection was due to the nature of the research topic and selected instruments; the researcher examined data-driven decision-making from the teacher perspective, which grounded the research in using numerical values to ascertain teachers' perceptions. The researcher measured the participants' responses from the selected instruments on three quantitative variables and determined the relationship between the three variables. Additionally, the researcher examined whether there was a

difference in the relationship between teachers' perceptions of data-driven instructional leadership and DDDM self-efficacy and DDDM anxiety at the elementary and secondary levels.

Population

The population of the study included all full-time certified educators in a rural school district located in the southeast United States, which included 300 teachers. All certified full-time classroom teachers with direct teaching responsibilities were eligible to participate in the research study. The researcher selected the school district and participants due to the convenience of sampling and ability of the researcher to have access to participants. The school district permitted each administrator within the school district to allow the classroom teachers to participate in the study. For purposes of the research, the participation of all certified personnel within the school district was not appropriate due to the research questions which addressed teachers' perceptions and not the perceptions of other certificated personnel within a school system such as school counselors, administrators, instructional coaches, and media specialists.

The researcher determined the distinction between elementary and secondary levels in this study using the following grade spans: elementary teachers teach in grade spans pre-kindergarten through grade 5, and secondary teachers teach in grade spans grade 6 through grade 12. Subsequently, the number of potential teachers at each level of schooling consisted of elementary teachers ($N = 140$) and secondary teachers ($N = 160$).

Instrumentation

The researcher identified two surveys to examine the relationship between teachers' perceptions of data-driven instructional leadership, teacher DDDM self-efficacy, and DDDM anxiety. The first survey assessed teachers' perception of data-driven instructional leadership and the second survey assessed teacher DDDM self-efficacy and DDDM anxiety.

DISL. The Data-Informed School Leadership Framework (Sun et al., 2016) assesses four leadership domains using a 6-point Likert scale ranging from *Strongly Disagree* to *Strongly Agree*. The four domains are derived from the nine leadership practices that the researchers identified in the extensive literature review (Sun et al., 2016) that focused on research conducted in the past ten years. These four domains and nine leadership practices were derived from 60 studies. The research design of the 60 studies consisted of 24 qualitative studies: five studies used quantitative methods, 15 studies used quantitative and qualitative methods, and 16 were conceptual or review articles. The research studies were conducted in elementary, middle, and high schools, or a mixed configuration of these schools, in North American and European countries (Sun et al., 2016). For the purpose of this research, the researcher utilized the DISL in its entirety to assess teachers' perceptions of data-driven instructional leadership. The researcher chose the DISL because the instrument has been validated and has shown to meet high standards of reliability (Sun et al., 2016). The scale has a Cronbach's Alpha of .98, indicating that it is highly reliable. The reliabilities for the four dimensions of the DISL were also very high, ranging from .92 to .95 (Sun et al., 2016; see Appendix A).

3D-MEA. The Data-driven Decision-making Efficacy and Anxiety (3D-MEA) Inventory assesses four dimensions of self-efficacy and one dimension of anxiety using a 5-point Likert scale ranging from *Strongly Disagree* to *Strongly Agree* (Dunn et al., 2013). The 3D-MEA utilizes 20 behavioral statements that underpin the five dimensions referenced above; the instrument assesses teachers' belief in their ability and capacity to complete data-related tasks that have been identified as highly effective practices. Dunn et al. (2013) calculated the internal consistency reliability (Cronbach's alpha) for each dimension/rating scale scores ranged from

0.84 to 0.92, which indicates that the 3D-MEA scales exhibit strong internal consistency reliability (see Appendix B).

Data Collection

The researcher made initial contact with the superintendent through a letter identifying the researcher as a doctoral student in Educational Leadership at Georgia Southern University. In the letter, the researcher explained the goal of the study and asked permission to contact teachers within the superintendent's school district. The letter emphasized that the only contact with the teachers would be via e-mail, that the survey could be completed online, and that no visits, meetings, or other activities would be conducted that could in any way interfere with the teachers' schedules. The letter stated that the researcher expected the survey to take approximately 15-20 minutes of a teacher's time, and that individual responses would be kept confidential. The letter also contained the researcher's contact information and indicated that the researcher would call the superintendent to answer any questions he or she might have while considering the request. A form that the superintendent could complete and sign to indicate his or her decision was included with the letter.

Upon obtaining the superintendent's permission (see Appendix C), the principal investigator requested lists of certified teachers' e-mail addresses from the district office, as well as by contacting individuals designated by the superintendent of each of the participating schools. Additionally, the researcher sought permission to conduct the study from the Institutional Research Board at Georgia Southern University to conduct the study (see Appendix D), and permission was granted. The researcher then emailed the principal of each school the Superintendent Consent Form and a Teacher Consent Form. Included in the Teacher Consent Form was additional information regarding the study's purpose, participant confidentiality, and

the researcher's contact information. The teachers were informed that their participation in the study was strictly voluntary and there would be no negative consequences for non-participation. Additionally, the teachers were instructed that by completing the survey through *Qualtrics*, they were providing passive consent.

The survey instrument was composed of three sections: demographic information, the DISL, and 3D-MEA. The principal of each school emailed the Teacher Consent Form via email to his or her staff, asking the teachers to complete the survey using a hyperlink contained in the email message. The survey participation window was open for a period of 3 weeks, with reminders emailed to participants at the end of each 7-day period. A copy of the survey is included as Appendix E.

Data Analysis

The researcher input the teachers' responses to the DISL and 3D-MEA into SPSS in order to conduct a correlational analysis among the three variables: teacher sense of self-efficacy for DDDM, teacher anxiety for DDDM, and teachers' perceptions of data-driven instructional leadership. Additionally, the researcher conducted a regression analysis in order to ascertain how much data-driven instructional leadership explained the teachers' sense of self-efficacy and anxiety for DDDM. To determine whether there is a difference in the relationship between teachers' perceptions of data-driven instructional leadership and teacher sense of self-efficacy and anxiety for data-driven decision-making at the elementary and secondary levels, the researcher incorporated the school level variable into the regression analysis.

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Limitations, Delimitations, and Assumptions

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The study possessed several limitations that affected the ability to generalize. First, the researcher used the teachers' perceptions of principals' data behaviors that were centered on a

single school district in South Georgia; these perceptions did not provide a representative sample of the teaching population across the United States, nor across Georgia. The teachers had the option to elect to take the survey or not take the survey. However, generalizations was not the aim of this applied research study.

Several assumptions were made in the research study. First, the researcher assumed that each participant objectively measured the data practices of his or her administrators as measured by the survey instrument. The researcher expected the participants in the study to self-report their ability as it relates to collecting and analyzing data as measured by the 3D-MEA Inventory (Dunn et al., 2011). In addition, the researcher assumed that each participant provided an unbiased assessment of their capacities and skills due to the anonymous reporting of results. A common occurrence in self-reporting studies are the incidents of participants reporting answers based on socially desirable answers and the expected norm, instead of the actual level of performance or engagement in the reported question (Donaldson & Grant-Vallone, 2002).

With regard to the principal, the researcher assumed that if a participant reported his or her principal as demonstrating high levels of data-driven instructional leadership, then the respondent reported high levels of DDDM self-efficacy and low DDDM anxiety for data-driven decision-making. The reverse of the assumption was assumed true as well; if the respondent reported their principal to reflect the low effectiveness of data-driven instructional leadership, the researcher assumed that their response relating to self-efficacy for data-driven decision-making reflected low DDDM self-efficacy and high DDDM anxiety for data-driven decision-making.

Chapter Summary

The purpose of this research was to ascertain the relationship between teachers' perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. A further purpose of this study was to examine whether there was a difference in the relationship between teachers' perceptions of data-driven instructional leadership and teacher sense of self-efficacy and anxiety for data-driven decision-making at the elementary and secondary levels. The researcher conducted the study in a rural southeastern school district in Georgia; the participant population contained approximately 300 certified educators employed in one of five schools. To obtain teachers' perceptions of DISL and teacher DDDM self-efficacy and anxiety, the researcher utilized anonymous surveys to capture participants' perception data, as well as to provide the dataset that the researcher utilized to complete the correlational analysis.

CHAPTER 4

REPORT OF DATA AND DATA ANALYSIS

The purpose of this research study was to ascertain the relationship between the teachers' perceptions of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. Additionally, the research study examined if teachers' school level (elementary or secondary) influenced their perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. Due to the expectation of classroom teachers' level of integration of DDDM throughout the United States, particularly in the state of Georgia, the instructional characteristics of a principal that contribute to higher levels of teachers' self-efficacy regarding data-driven decision-making and low anxiety were paramount.

The researcher implemented a correlational research design (Creswell, 2012) to examine the relationship between teachers' perceptions of data-driven instructional leadership and examined if teachers' school level (elementary or secondary) influenced their perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. A total of 219 Georgia classroom teachers responded to an online survey that the researcher administered via *Qualtrics*. The survey was composed of the following two instruments: Data-Informed School Leadership Framework (DISL) Sun et al. (2016) and Data-driven Decision-making Efficacy and Anxiety Inventory (3D-MEA; Dunn & Dunn, 2012). The researcher keyed the survey results into the Statistical Package for Social Sciences to conduct a correlational analysis among the three variables (Creswell, 2012). Additionally, the researcher conducted a regression analysis to ascertain how teachers' perceptions of data-driven instructional leadership predict teachers' sense of self-efficacy and anxiety for DDDM. To

determine the relationship between the teachers' perception of data-driven instructional leadership and teachers' sense of self-efficacy and anixety for data-driven decision-making, the researcher incorporated the school level variable into the regression analysis. The researcher begins this chapter with a review of the research questions. The chapter continues with a discussion on the research design, followed by a discussion of the response rate and a description of the respondents. The findings from data analysis are then reported, concluding with a summary of the chapter.

Research Questions

The researcher developed three research questions to investigate the relationship between the teachers' perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making and to examine teachers' sense of self-efficacy and anxiety across the elementary and secondary levels. These questions were:

1. What are teachers' perceptions regarding data-driven instructional leadership?

2. What are teachers' self-reported self-efficacy and anxiety regarding DDDM?

3. What is the relationship between teachers' perceptions of data-driven instructional leadership, school level (elementary and secondary), and teacher sense of self-efficacy and anxiety for data-driven decision-making?

Research Design

The researcher utilized a correlational research design to examine the relationship between teachers' perception of data-driven instructional leadership and teacher sense of self-efficacy, school level, and anxiety for data-driven decision-making. Additionally, the researcher utilized a correlational design to determine whether there was a difference in the relationship between teachers' perceptions of data-driven instructional leadership and DDDM self-efficacy

and DDDM anxiety for DDDM at the elementary and secondary levels. A correlational research design utilizes correlational statistics to describe and measure the relationship between two or more variables for a set of scores (Creswell, 2012). The three major variables in this correlational study were teacher sense of self-efficacy for DDDM, teacher anxiety for DDDM, and teachers' perceptions of data-driven instructional leadership. Data-driven instructional leadership was the predictor variable, and sense of self-efficacy and anxiety for DDDM were the criterion variables. The researcher included school level as a control variable in the analysis.

The rationale for a non-experimental quantitative research method selection was due to the nature of the research topic and selected instruments; the researcher examined data-driven decision-making from the teacher perspective which grounded the research in using numerical values to ascertain teachers' perceptions. The researcher measured the participants on three quantitative variables and determined the relationship between the three variables. Additionally, there was no random assignment of the participants, no treatments, and there was no manipulation of any of the variables.

Response Rate

The researcher did not gather a sample; rather, the researcher provided the survey to all certified classroom teachers in elementary and secondary levels ($N = 300$) of schools where permission had been obtained. The survey was shared and opened for participants to complete for a period of three weeks with an email reminder at the end of each 7-day period. In the category of elementary schools (Pre-K–Grade 5), the researcher calculated a response rate of 66% after receiving 93 responses out of a possible 140. In the category of secondary schools (Grade 6 – Grade 12), the researcher calculated a response rate of 79% based on receiving completed surveys from 126 respondents out of 160. The researcher calculated a cumulative

response rate of 73%, with 219 respondents completing the survey instrument out of 300. The

response rate excluded incomplete responses to any component of the survey delivered via

Qualtrics.

Description of Respondents

The study population consisted of full-time teachers from a rural southeastern school

system in Georgia. The respondents were classified into two categories: elementary school

respondents were defined as those that serviced Pre-K through grade 5, and secondary school

respondents were defined as those that serviced grade 6 through grade 12. The majority

respondents were secondary teachers, as well, most of the population had taught in their

respective school for 0-4 years. However, 67% of teachers had been educators for more than 10

years (see Table 1). The researcher obtained permission to gather teachers' perceptions of data-

driven instructional leadership and teacher sense of self-efficacy and anxiety for data-driven

decision-making from three elementary schools, one middle school, and one high school. Each

full-time teacher in the district was eligible to participate.

Table 1

Frequencies and Percentages of Respondents' Demographic Characteristics (N = 219)

Variable		N	%
Type of Teacher	Elementary	93	42.5
	Secondary	126	57.5
Years in Current School	less than 1 year	21	9.5
	1 year	74	33.8
	2-4 years	61	27.9
	5-9 years	39	17.8
	more than 10 years	24	11.0
Years of Experience	1 year	9	4.1
	2-4 years	33	15.1
	5-9 years	30	13.7
	10-15 years	55	25.1
	more than 15 years	92	42.0

Collectively, the available population for this study included approximately 300 certified teachers ($N = 300$). These numbers were approximate as the available population of certified teachers likely fluctuated due to turnover, attrition, or other extraneous factors at the time the survey was administered. Out of the 300 invited participants, 219 participants completed the survey, consisting of 93 elementary teachers (42.5%) and 126 secondary level teachers (57.5%).

Findings

For purposes of this chapter, the researcher has organized the analytical findings into three sections, corresponding with the three research questions. The findings to each research question are presented in tabular form, coupled with a narrative discussion on specific survey responses that indicated points germane to the findings. The researcher then concludes the chapter with a summary of the results.

Teachers' Perceptions of Data-driven Instructional Leadership

The first research question asked: What are teachers' perceptions regarding data-driven instructional leadership? To answer the first research question, the researcher administered the Data-Informed School Leadership survey (DISL; Sun et al., 2016). This instrument assessed nine different variables of instructional leadership and consisted of a 6-point Likert scale utilizing a rating scale from "Strongly Disagree" to "Strongly Agree." The researcher then analyzed the teachers' responses to the survey instrument ($N = 219$) using frequency analysis to determine the number of occurrences on each of the nine survey questions (Trochim, 2000). Incomplete and partial responses were not included. For purpose of this research, the findings to research question one are first reported in totality ($N = 219$) and then shown by elementary teacher responses ($N = 93$) and secondary teacher responses ($N = 126$).

All teachers' perceptions. The findings from data analysis that show the summary of survey responses from all teacher respondents indicate the teachers perceived data-driven instructional leadership was prominent in their schools. The majority of survey respondents in this study reported either "Agree" or "Strongly Agree" on the nine survey items. While the majority of the survey respondents responded "Agree" or "Strongly Agree" to the nine questions on the DISL, the strongest indicators can be shown on survey questions 1 and 2 (see Table 2). Survey question 1 required the participants to rate if their school leaders analyze multiple data sources and longitudinal data to identify teaching and learning goals. The findings to survey question 1 show 44% of the respondents "Agree" and 40% "Strongly Agree" that this practice is actualized in their schools. Survey question 2 required the participants to rate the degree to which school leadership fosters a whole-school systematic approach to the goal achievement process.

Table 2

Percentage of Responses for DISL Items by All Survey Respondents (N=219)

Variable	SD	D	SWD	SWA	A	SA
Q1. Analyzes multiple data sources and longitudinal data to identify teaching and learning goals	3%	1%	1%	11%	44%	40%
Q2. Fosters a whole-school systematic approach to goal achievement process	3%	3%	2%	12%	40%	40%
Q3. Models data use	3%	3%	2%	19%	39%	34%
Q4. Provides individual support for data use especially through individual conferencing	3%	5%	5%	23%	39%	25%
Q5. Determines staff development needs by using data	3%	4%	5%	18%	42%	29%
Q6. Fosters collaborative knowledge construction and instructional strategy sharing	3%	3%	3%	15%	40%	37%
Q7. Builds trust to foster teachers' use of data	3%	4%	7%	18%	39%	29%
Q8. Promotes teaching practice that works through regular classroom observation	3%	3%	5%	16%	43%	31%
Q9. Monitors program and instruction effectiveness based on data analysis	3%	3%	4%	15%	43%	33%

Note: DISL utilized the following rating scale to indicate the level of agreement with each of the following statements: SD= Strongly Disagree; D = Disagree; SWD = Somewhat Disagree; SWA = Somewhat Agree; A = Agree; SA = Strongly Agree.

As Table 2 shows, 40% of all teacher respondents "Agree" and 40% "Strongly Agree" that the

instructional leader promotes a school-wide systematic approach to the goal achievement

process. The researcher noted that only 3% of the participants responded, "Strongly Disagree,"

and 5% or less responded "Disagree" to any of the nine DISL survey questions.

Elementary teachers' perceptions. In regard to elementary teachers, the findings from

data analysis showed the summary of survey responses from all elementary teacher respondents

(*N* = 93) indicated that elementary teachers perceived data-driven instructional leadership was

practiced in their schools. The majority of elementary teacher respondents reported either

"Agree" or "Strongly Agree" on the nine survey questions (see Table 3). The strongest indicators

can be shown on survey questions 1, 2, and 6.

Table 3

Percentage of Responses for DISL Items by Elementary Level (N=93)

Variable	SD	D	SWD	SWA	A	SA
Q1. Analyzes multiple data sources and longitudinal data to identify teaching and learning goals	4%	2%	2%	4%	44%	43%
Q2. Fosters a whole-school systematic approach to goal achievement process	3%	3%	2%	5%	43%	43%
Q3. Models data use	3%	2%	3%	14%	42%	35%
Q4. Provides individual support for data use especially through individual conferencing	4%	5%	3%	18%	38%	31%
Q5. Determines staff development needs by using data	3%	3%	5%	15%	38%	35%
Q6. Fosters collaborative knowledge construction and instructional strategy sharing	3%	3%	3%	9%	41%	41%
Q7. Builds trust to foster teachers' use of data	3%	1%	6%	9%	44%	37%
Q8. Promotes teaching practice that works through regular classroom observation	3%	2%	2%	5%	49%	38%
Q9. Monitors program and instruction effectiveness based on data analysis	4%	2%	3%	10%	44%	37%

Note: DISL utilized the following rating scale to indicate the level of agreement with each of the following statements: SD= Strongly Disagree; D = Disagree; SWD = Somewhat Disagree; SWA = Somewhat Agree; A = Agree; SA = Strongly Agree.

In response to survey question 1, the elementary teacher respondents responded that they

"Agree" (44%) or "Strongly Agree" (43%) that instructional leadership in their schools analyzes

multiple data sources and longitudinal data to identify teaching and learning goals. In conjunction, the elementary teacher respondents reported that they "Agree" (43%) and "Strongly Agree" (43%) on survey question 2, illustrating that elementary teachers do perceive that the instructional leader in their schools endorses a school-wide approach. Survey question 6 addressed how elementary teachers perceive instructional leadership fosters collaborative knowledge construction and strategy sharing; in response to this question, 41% of the elementary teacher respondents responded, "Agree" and 41% responded, "Strongly Agree."

Secondary teachers' perceptions. In regard to secondary teachers, the findings from data analysis show the summary of survey responses from all secondary teacher respondents (N = 126) indicate secondary teachers perceived data-driven instructional leadership was practiced in their schools much like the elementary teacher respondents did. The secondary teacher respondents overwhelmingly reported either "Agree" or "Strongly Agree" on the nine survey items (see Table 4). Further, the researcher noted that 3% or less of the participants responded "Strongly Disagree" to all nine survey questions. A review of the secondary teachers' responses indicated that the strongest indicators were reported on survey questions 1, 2, and 6.

In response to survey question 1, the secondary teacher respondents recorded "Agree" (42%) or "Strongly Agree" (37%) that instructional leadership in their schools analyzes multiple data sources and longitudinal data to identify teaching and learning goals. In conjunction, the secondary teacher respondents reported "Agree" (38%) and "Strongly Agree" (37%) on survey question 2, illustrating that secondary teachers do perceive that instructional leadership in their schools endorses a school-wide approach. Survey question 6 addressed how secondary teachers perceive whether their instructional leadership fosters collaborative knowledge construction and strategy sharing or not and 40% of the secondary teacher respondents reported that they "Agree"

and 33% "Strongly Agree" instructional leadership does foster collaborative knowledge

construction and strategy sharing in their schools.

Table 4

Percentage of Responses for DISL Items by Secondary Level (N=126)

Variable	SD	D	SWD	SWA	A	SA
Q1. Analyzes multiple data sources and longitudinal data to identify teaching and learning goals	2%	1%	1%	17%	42%	37%
Q2. Fosters a whole-school systematic approach to goal achievement process	3%	2%	2%	18%	38%	37%
Q3. Models data use	2%	4%	2%	22%	37%	33%
Q4. Provides individual support for data use especially through individual conferencing	2%	6%	6%	26%	41%	20%
Q5. Determines staff development needs by using data	2%	5%	4%	20%	44%	25%
Q6. Fosters collaborative knowledge construction and instructional strategy sharing	2%	2%	3%	19%	40%	33%
Q7. Builds trust to foster teachers' use of data	3%	6%	7%	25%	35%	24%
Q8. Promotes teaching practice that works through regular classroom observation	2%	3%	7%	23%	38%	26%
Q9. Monitors program and instruction effectiveness based on data analysis	2%	4%	4%	18%	42%	30%

Note: DISL utilized the following rating scale to indicate the level of agreement with each of the following statements: SD= Strongly Disagree; D = Disagree; SWD = Somewhat Disagree; SWA = Somewhat Agree; A = Agree; SA = Strongly Agree

Teachers' Self-reported Self-efficacy and Anxiety

The second research question asked: What are teachers' self-reported self-efficacy and

anxiety regarding DDDM? To answer the second research question, the researcher administered

the Data-driven Decision-making Self-efficacy and Anxiety (3D-MEA) Inventory. The 3D-MEA

assesses four dimensions of self-efficacy (survey items 1-15) and one dimension of anxiety

(survey items 16-20) using a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly

Agree" (Dunn et al., 2013). The 3D-MEA utilizes 20 behavioral statements that underpin the five

dimensions referenced above; the instrument assesses teachers' belief in their ability and

capacity to complete data-related tasks that have been identified as highly effective practices.

Teachers' responses to the survey instrument (*N*=219) were then analyzed using frequency

analysis to determine the number of occurrences on the four dimensions of self-efficacy and one dimension of anxiety (Trochim, 2000). Complete and partial responses were not included.

For purposes of reporting, the findings to research question two are first reported in totality ($N = 219$) and then shown by elementary teacher responses ($N = 93$) and secondary teacher responses ($N = 126$) to address the four dimensions of self-efficacy as measured by 3D-MEA (survey questions 1-15). Following this, the findings from the frequency analysis (Trochim, 2000) are then reported in totality for all teacher respondents ($N = 219$) to survey questions (16-20) and then shown by elementary teacher responses ($N = 93$) and secondary teacher responses ($N = 126$) to address the one dimension of anxiety as measured by 3D-MEA.

All teachers' self-reported efficacy. The findings from data analysis show the summary of survey responses from all teachers for survey questions 1-15, which assessed teachers' self-reported self-efficacy regarding DDDM, indicated the majority of teachers report high levels of DDDM efficacy. The majority of survey respondents marked "Agree" or "Strongly Agree" on each of the 15 survey items (see Table 5). The strongest indicators can be shown on survey questions 1, 3, 7, 12, 13, and 14.

Survey question 1 required participants to rate their level of confidence in their ability to access state assessment results for students. The findings to survey question 1 show 36% of participants "Agree" and 53% "Strongly Agree." Survey question 3 addressed the participants' confidence in knowing what types of data or reports they need to assess student performance and 42% of respondents reported "Agree" and 48% "Strongly Agree." Survey question 7 addressed the participants' confidence in their ability to understand assessment reports; in response to this question, 41% of respondents reported "Agree" and 50% responded "Strongly Agree." Survey question 13 addressed the participants' confidence in their ability to use assessment data to

identify gaps in their instructional curriculum and 46% of respondents reported "Agree" and

45% "Strongly Agree." Survey question 14 addressed the participants' confidence in their ability

to use data to group students with similar learning needs for instruction; 42% of respondents

reported "Agree" and 50% marked "Strongly Agree" on this question.

Table 5

Percentage of Responses on 3D-MEA Efficacy Survey Items (N=219)

Variable	SD	D	N	A	SA
Q1. I am confident in my ability to access state assessment results for my students	1%	5%	5%	36%	53%
Q2. I am confident that I know what types of data or reports I need to assess group performance.	2%	3%	5%	47%	43%
Q3.I am confident that I know what types of data or reports I need to assess student performance.	2%	3%	4%	42%	48%
Q4.I am confident I can use the tools provided by my district's data technology system to retrieve charts, tables or graphs for analysis.	1%	5%	9%	44%	41%
Q5. I am confident I can use the tools provided by my district's data technology system to filter students into different groups for analysis.	2%	5%	10%	47%	36%
Q6. I am confident that I can use my district's data analysis technology to access standard reports.	2%	5%	7%	45%	41%
Q7. I am confident in my ability to understand assessment reports.	1%	3%	4%	41%	50%
Q8. I am confident in my ability to interpret student performance from a scaled score.	1%	5%	4%	46%	44%
Q9.I am confident in my ability to interpret subtest or strand scores to determine student strengths and weaknesses in a content area and weaknesses in a content area.	2%	5%	7%	48%	37%
Q10. I am confident that I can use data to identify students with special learning needs.	1%	3%	5%	43%	48%
Q11. I am confident that I can use data to identify gaps in student understanding of curricular concepts.	1%	5%	7%	44%	44%
Q12.I am confident that I can use assessment data to provide targeted feedback to students about their performance or progress.	1%	3%	5%	44%	46%
Q13.I am confident I can use assessment data to identify gaps in my instructional curriculum.	1%	3%	5%	46%	45%
Q14. I am confident that I can use data to group students with similar learning needs for instruction.	1%	2%	5%	42%	50%
Q15. I am confident in my ability to use data to guide my selection of targeted interventions for gaps in student understanding.	1%	5%	8%	47%	40%

Note: The 3D-MEA utilized the following rating scale to assess the teachers' beliefs in their abilities to effectively analyze and interpret student data to successfully connect or apply their interpretation of data findings to classroom instruction and to improve student learning. Ratings: SD= Strongly Disagree; D = Disagree; N = Neither Agree Nor Disagree; A = Agree; SA = Strongly Agree.

Elementary teachers' self-reported efficacy. In regard to elementary teachers, the findings from data analysis show the summary of survey responses from all elementary teacher respondents ($N = 93$) indicated elementary teachers acknowledge having high levels of DDDM efficacy in their schools. The elementary teacher respondents overwhelmingly reported either "Agree" or "Strongly Agree" on the 15 survey questions as measured by 3D-MEA (see Table 6). The strongest indicators can be shown on survey questions 1, 3, 7, 12, and 14.

In response to survey question 1, elementary participants rated their level of confidence in their ability to access state assessment results for students. The findings indicated 40% of participants "Agree" and 48% "Strongly Agree." Survey question 3 addressed the participants' confidence in knowing what types of data or reports they need to assess student performance and 37% of respondents reported "Agree" and 55% marked "Strongly Agree." Survey question 7 addressed the participants' confidence in their ability to understand assessment reports and 44% of respondents reported "Agree" while 47% marked "Strongly Agree." Survey question 12 addressed the participants' confidence to use assessment data to provide targeted feedback to students about their performance or progress and 45% of respondents reported "Agree" and 48% recorded "Strongly Agree". Survey question 14 addressed the participants' confidence in their ability to use data to group students with similar learning needs for instruction and 37% of respondents reported "Agree" and 57% reported "Strongly Agree."

The researcher noted that only 2% or less of all elementary teacher respondents indicated "Strongly Disagree" on any of the 15 survey questions of the 3D-MEA. This finding supports elementary teachers' high self-reported levels of self-efficacy to access state assessment results for students, to analyze and interpret the assessment results, and use the assessment results to inform their instruction.

Table 6

Percentage of Responses on 3D-MEA Efficacy Survey Items by Elementary Level (N=93)

Variable	SD	D	N	A	SA
Q1. I am confident in my ability to access state assessment results for my students	1%	4%	6%	40%	48%
Q2. I am confident that I know what types of data or reports I need to assess group performance.	2%	2%	4%	42%	49%
Q3. I am confident that I know what types of data or reports I need to assess student performance.	2%	2%	4%	37%	55%
Q4. I am confident I can use the tools provided by my district's data technology system to retrieve charts, tables or graphs for analysis.	1%	5%	10%	37%	47%
Q5. I am confident I can use the tools provided by my district's data technology system to filter students into different groups for analysis.	2%	6%	9%	42%	41%
Q6. I am confident that I can use my district's data analysis technology to access standard reports.	1%	6%	6%	41%	45%
Q7. I am confident in my ability to understand assessment reports.	1%	3%	4%	44%	47%
Q8. I am confident in my ability to interpret student performance from a scaled score.	1%	9%	1%	46%	43%
Q9. I am confident in my ability to interpret subtest or strand scores to determine student strengths and weaknesses in a content area and weaknesses in a content area.	2%	5%	4%	47%	41%
Q10. I am confident that I can use data to identify students with special learning needs.	2%	3%	3%	39%	53%
Q11. I am confident that I can use data to identify gaps in student understanding of curricular concepts.	1%	5%	3%	45%	45%
Q12. I am confident that I can use assessment data to provide targeted feedback to students about their performance or progress.	2%	2%	2%	45%	48%
Q13. I am confident I can use assessment data to identify gaps in my instructional curriculum.	1%	3%	5%	42%	48%
Q14. I am confident that I can use data to group students with similar learning needs for instruction.	1%	2%	3%	37%	57%
Q15. I am confident in my ability to use data to guide my selection of targeted interventions for gaps in student understanding.	2%	5%	9%	41%	43%

Note: The 3D-MEA utilized the following rating scale to assess the teachers' beliefs in their abilities to effectively analyze and interpret student data to successfully connect or apply their interpretation of data findings to classroom instruction and to improve student learning. Ratings: SD= Strongly Disagree; D = Disagree; N = Neither Agree Nor Disagree; A = Agree; SA = Strongly Agree.

Secondary teachers' self-reported efficacy. In regard to secondary teachers, the findings from data analysis show the summary of survey responses from all secondary teacher respondents ($N = 126$) indicated secondary teachers report high levels of DDDM efficacy in their schools. The secondary teacher respondents overwhelmingly reported either "Agree" or "Strongly Agree" on the 15 survey questions (see Table 7). On a similar comparison to the elementary teacher respondents, the strongest indicators can be shown on survey questions 1, 3, 7, 12, and 14.

For survey question 1, secondary teacher participants rated their level of confidence in their ability to access state assessment results for students. The findings indicated 33% of participants "Agree" and 57% "Strongly Agree." Survey question 3 addressed the participants' confidence in knowing what types of data or reports they need to assess student performance and 47% of respondents reported "Agree" and 44% "Strongly Agree." Survey question 7 addressed the participants' confidence in their ability to understand assessment reports and 39% of respondents reported "Agree" and 52% marked "Strongly Agree." Survey question 12 addressed the participants' confidence to use assessment data to provide targeted feedback to students about their performance or progress and 44% of respondents reported "Agree" and 44% "Strongly Agree". Finally, survey question 14 addressed the participants' confidence in their ability to use data to group students with similar learning needs for instruction and 46% of respondents reported "Agree" and 45% marked "Strongly Agree."

Table 7

Percentage of Responses on 3D-MEA Efficacy Survey Items by Secondary Level (N=126)

Variable	SD	D	N	A	SA
Q1. I am confident in my ability to access state assessment results for my students	2%	5%	3%	33%	57%
Q2. I am confident that I know what types of data or reports I need to assess group performance.	2%	3%	6%	50%	39%
Q3. I am confident that I know what types of data or reports I need to assess student performance.	2%	3%	4%	47%	44%
Q4. I am confident I can use the tools provided by my district's data technology system to retrieve charts, tables or graphs for analysis.	2%	5%	8%	50%	36%
Q5. I am confident I can use the tools provided by my district's data technology system to filter students into different groups for analysis.	2%	4%	11%	51%	33%
Q6. I am confident that I can use my district's data analysis technology to access standard reports.	2%	4%	8%	48%	37%
Q7. I am confident in my ability to understand assessment reports.	2%	3%	4%	39%	52%
Q8. I am confident in my ability to interpret student performance from a scaled score.	2%	3%	6%	45%	44%
Q9. I am confident in my ability to interpret subtest or strand scores to determine student strengths and weaknesses in a content area and weaknesses in a content area.	2%	5%	10%	49%	35%
Q10. I am confident that I can use data to identify students with special learning needs.	1%	2%	6%	47%	44%
Q11. I am confident that I can use data to identify gaps in student understanding of curricular concepts.	1%	4%	10%	43%	43%
Q12. I am confident that I can use assessment data to provide targeted feedback to students about their performance or progress.	1%	3%	8%	44%	44%
Q13. I am confident I can use assessment data to identify gaps in my instructional curriculum.	1%	3%	5%	49%	42%
Q14. I am confident that I can use data to group students with similar learning needs for instruction.	1%	2%	6%	46%	45%
Q15. I am confident in my ability to use data to guide my selection of targeted interventions for gaps in student understanding.	1%	4%	7%	51%	37%

Note: The 3D-MEA utilized the following rating scale to assess the teachers' beliefs in their abilities to effectively analyze and interpret student data to successfully connect or apply their interpretation of data findings to classroom instruction and to improve student learning. Ratings: SD= Strongly Disagree; D = Disagree; N = Neither Agree Nor Disagree; A = Agree; SA = Strongly Agree.

Teachers' self-reported anxiety. To address the one dimension of anxiety (survey

questions 16-20) measured by 3D-MEA, the findings from data analysis indicated that the

majority of teachers reported "Strongly Disagree" or "Disagree" to the five survey questions.

The strongest indicators can be shown on survey questions 17, 18, and 20; however, survey

question 16 indicated possible anxiety regarding DDDM as it relates to statistics. The findings

relating to teachers' levels of anxiety regarding DDDM are first reported in totality (see Table 8).

Table 8

Percentage of Responses on 3D-MEA Anxiety Survey Items (N=219)

Variable	*SD*	*D*	*N*	*A*	*SA*
Q16. I am intimidated by statistics.	18%	34%	19%	19%	11%
Q17. I am intimidated by the task of interpreting students 'state level standardized assessments.	20%	36%	18%	17%	10%
Q18. I am concerned that I will feel or look "dumb" when it comes to data-driven decision-making.	25%	37%	17%	14%	7%
Q19. I am intimidated by my district's data retrieval technology.	21%	39%	21%	13%	6%
Q20. I am intimidated by the process of connecting data analysis to my instructional practice.	22%	41%	18%	14%	5%

Note: The 3D-MEA utilized the following rating scale to assess the teachers' beliefs in their abilities to effectively analyze and interpret student data to successfully connect or apply their interpretation of data findings to classroom instruction and to improve student learning. Ratings: SD= Strongly Disagree; D = Disagree; N = Neither Agree Nor Disagree; A = Agree; SA = Strongly Agree.

In response to survey question 17, the teacher respondents rated their degree of

intimidation to interpret students' state level standardized assessments. The findings indicated

20% of participants "Strongly Disagree" and 36% "Disagree." At the same time, 17% recorded

"Agree" and 10% responded "Strongly Agree" to survey question 17, indicating the teacher

respondents experience anxiety and do feel degrees of intimidation when interpreting students'

state level standardized assessments. Survey question 18 assessed whether participants were

concerned they would feel or look "dumb" when it comes to data-driven decision-making with

27% reporting "Strongly Disagree" and 37% "Disagree." Survey question 20 addressed whether

the participants were intimidated by the process of connecting data analysis to their instructional

practice and 22% of respondents reported "Strongly Disagree" and 41% "Disagree." Further, the

researcher noted that 19% of respondents reported "Agree" and 11% "Strongly Agree" on survey

question 16 that rated how intimidated they were by statistics; responses to survey question 16

indicate that statistics is a potential area of concern and should be monitored by school

leadership.

   Elementary teachers' self-reported anxiety. Regarding elementary teachers, the

findings from data analysis show the summary of survey responses from all elementary teacher

respondents ($N = 93$) indicated elementary teachers had moderate levels of DDDM anxiety in

their schools. The elementary teacher respondents reported either "Strongly Disagree" or

"Disagree" on survey questions 16-20. The strongest indicators can be shown on survey

questions 18 and 20; question 16 indicated that the teachers have moderate anxiety regarding

DDDM (see Table 9).

   In response to survey question 18, the elementary teacher respondents were asked

whether they were concerned that they will feel or look "dumb" when it comes to data-driven

decision-making. The findings indicated that 22% of participants "Strongly Disagree" and 41%

"Disagree." Survey question 20 addressed whether the participants were intimidated by the

process of connecting data analysis to their instructional practice and 23% of respondents

reported "Strongly Disagree" and 41% reported "Disagree." Further, the researcher noted that

20% of the elementary respondents reported "Agree" and 14% "Strongly Agree" on survey

question 16 that rated how intimidated they were by statistics. The responses to survey question

16 indicate that statistics is an area of concern for elementary teachers.

Table 9

Percentage of Responses on 3D-MEA Anxiety Survey Items by Elementary Teachers

Variable	SD	D	N	A	SA
Q16. I am intimidated by statistics.	16%	28%	22%	20%	14%
Q17. I am intimidated by the task of interpreting students 'state level standardized assessments.	20%	33%	18%	16%	12%
Q18.I am concerned that I will feel or look "dumb" when it comes to data-driven decision-making.	22%	41%	14%	14%	10%
Q19.I am intimidated by my district's data retrieval technology.	17%	38%	23%	13%	10%
Q20. I am intimidated by the process of connecting data analysis to my instructional practice.	23%	41%	19%	11%	6%

Note: The 3D-MEA utilized the following rating scale to assess the teachers' beliefs in their abilities to effectively analyze and interpret student data to successfully connect or apply their interpretation of data findings to classroom instruction and to improve student learning. Ratings: SD= Strongly Disagree; D = Disagree; N = Neither Agree Nor Disagree; A = Agree; SA = Strongly Agree.

Secondary teachers' self-reported anxiety. Upon examination of secondary teacher respondents, the findings from data analysis show the summary of survey responses (*N* = 126) indicate secondary teachers reported moderate levels of DDDM anxiety in their schools. Overall, the secondary teacher respondents reported either "Strongly Disagree" or "Disagree" to questions 16-20 on the survey (see Table 10). The strongest indicators can be shown on survey questions 18, 19, and 20.

For survey question 18, the secondary participants rated whether they were concerned that they will feel or look "dumb" when it comes to data-driven decision-making. The findings indicated 27% of participants "Strongly Disagree" and 34% "Disagree." On survey question 19, the secondary participants rated whether they were intimidated by the district's data retrieval technology. The findings indicated that 25% of participants "Strongly Disagree" and 41% "Disagree." In conjunction, survey question 20 addressed whether the participants were

intimidated by the process of connecting data analysis to their instructional practice and 22% of

respondents reported "Strongly Disagree" and 41% "Disagree."

Table 10

Percentage of Responses on 3D-MEA Anxiety Survey Items by Secondary Teachers

Variable	SD	D	N	A	SA
Q16. I am intimidated by statistics.	19%	39%	17%	18%	8%
Q17. I am intimidated by the task of interpreting students 'state level standardized assessments.	20%	37%	18%	18%	8%
Q18.I am concerned that I will feel or look "dumb" when it comes to data-driven decision-making.	27%	34%	19%	14%	6%
Q19.I am intimidated by my district's data retrieval technology.	25%	41%	19%	13%	3%
Q20. I am intimidated by the process of connecting data analysis to my instructional practice.	22%	41%	17%	16%	4%

Note: The 3D-MEA utilized the following rating scale to assess the teachers' beliefs in their abilities to effectively analyze and interpret student data to successfully connect or apply their interpretation of data findings to classroom instruction and to improve student learning. Ratings: SD= Strongly Disagree; D = Disagree; N = Neither Agree Nor Disagree; A = Agree; SA = Agree.

Relationship between Teachers' Perception on Data-driven Instructional Leadership, School Level, and Sense of Self-efficacy and Anxiety towards Data-driven Decision-making

The third research question asked: What is the relationship between teachers' perceptions

of data-driven instructional leadership, school level (elementary and secondary), and teachers'

sense of self-efficacy and anxiety for data-driven decision-making? The researcher sought to

ascertain the relationship between the teachers' perception of data-driven instructional leadership

and their sense of self-efficacy and anxiety towards data-driven decision-making by determining

whether a relationship existed between the three major variables in this correlational study. The

three major variables were teachers' perceptions of data-driven instructional leadership (DISL),

teachers' sense of self-efficacy for DDDM, and teachers' anxiety for DDDM. Data-driven

instructional leadership was the predictor variable and teacher sense of efficacy and anxiety for

DDDM were the criterion variables. School level was included as a control variable. The nature of the third research question warranted the researcher's analysis of the data using descriptive statistics, correlation analysis, and regression analysis techniques (Trochim, 2000).

The findings to research question three are presented in narrative and tabular formats. Using descriptive statistical data analysis, the researcher first reported the measures of central tendency for all teacher participants, followed by a breakdown of elementary and secondary teacher participants for teachers' perceptions of data-driven instructional leadership, DDDM efficacy, and DDDM anxiety. Next, the researcher presents the findings from the correlational analysis that the researcher conducted to determine whether a relationship existed between the DISL scores and the DDDM efficacy and DDDM anxiety scores. The findings to research question three conclude with the results of a multiple regression analysis that was conducted using the following four variables: DISL, DDDM efficacy, school level, and DDDM anxiety.

Descriptive statistics for DISL, DDDM efficacy, and anxiety. The researcher calculated measures of central tendency for the three variables considered in the study for all participants (see Table 11). For DISL, the overall mean was 43.90 (SD = 9.52). For teacher self-reported efficacy on DDDM, the mean score was 63.93 (SD = 10.75). For teacher self-reported anxiety score on DDDM, the overall mean was 12.53 (SD = 5.39).

Table 11

Descriptive statistics for DISL, Teacher DDDM Efficacy, and Teacher DDDM Anxiety (N = 219)

	Range	Min	Max	M	SD
Data-Informed School Leadership (DISL)	45.00	9.00	54.00	43.90	9.52
Efficacy	60.00	15.00	75.00	63.93	10.75
Anxiety	20.00	5.00	25.00	12.53	5.39

Descriptive statistics for DISL, DDDM efficacy, and anxiety by school level. The

researcher then calculated measures of central tendency for the three variables considered in the

study by school level (see Table 12). For elementary schools, the mean DISL score was 44.85

(SD = 9.91) which was slightly higher than secondary schools with a mean DISL score of 43.19

(SD = 9.18). Elementary schools show a mean DDDM efficacy score of 64.34 (SD = 11.18),

which is slightly higher than secondary schools with a mean DDDM efficacy DDDM score of

63.63 (SD = 10.46). For the DDDM anxiety score, the elementary schools show a mean of 13.01

(SD = 5.64) and secondary schools have a mean of 12.17 (SD = 5.17).

Table 12

Descriptive statistics for DISL, Teacher DDDM Efficacy, and Teacher DDDM Anxiety by School
Level

	Range	Min	Max	M	SD
Elementary					
Data-Informed School Leadership (DISL)	45.00	9.00	54.00	44.85	9.92
Efficacy	60.00	15.00	75.00	64.34	11.18
Anxiety	20.00	5.00	25.00	13.01	5.64
Secondary					
Data-Informed School Leadership (DISL)	45.00	9.00	54.00	43.19	9.18
Efficacy	60.00	15.00	75.00	63.63	10.46
Anxiety	20.00	5.00	25.00	12.17	5.17

Note: Elementary $n = 93$; Secondary $n = 126$.

Correlation analysis for DISL, DDDM efficacy, and DDDM anxiety. The researcher

conducted correlational analyses to determine the relationship between the DISL scores and

DDDM efficacy and DDDM anxiety scores (see Table 13). The results from the correlational

analysis demonstrated a strong positive relationship indicating that those teachers with higher

DISL scores tended to report higher DDDM efficacy ($r = .680, p \leq .01$). The results of the

correlational analysis also demonstrated that there was no significant relationship between the

DISL scores and DDDM anxiety ($r = -.065$, $p > .05$). The closeness of the r value to zero indicates that almost no relationship was present between the variables.

Table 13

Correlation Analysis of DISL, DDDM Self-reported Efficacy, and DDDM Self-reported Anxiety

	Data-Informed School Leadership (DISL)	Efficacy	Anxiety
Data-Informed School Leadership (DISL)	---	.680**	-.065
Efficacy	.680**	---	-.269**
Anxiety	-.065	-.269**	---

To graphically represent the correlation between DISL and DDDM efficacy, the researcher constructed a scatter plot to demonstrate the relationship between the DISL scores and the DDDM efficacy scores (see Figure 2). Upon examination, the scatter plot illustrates that there was a positive relationship between the DISL scores and the DDDM efficacy scores. The data points show that higher data-driven instructional leadership scores are associated with higher efficacy scores. The researcher noted that majority of the respondents are clustered at the top right of the scatterplot; the clustering represents a high number of participants who report high levels of DISL and high levels of DDDM efficacy.
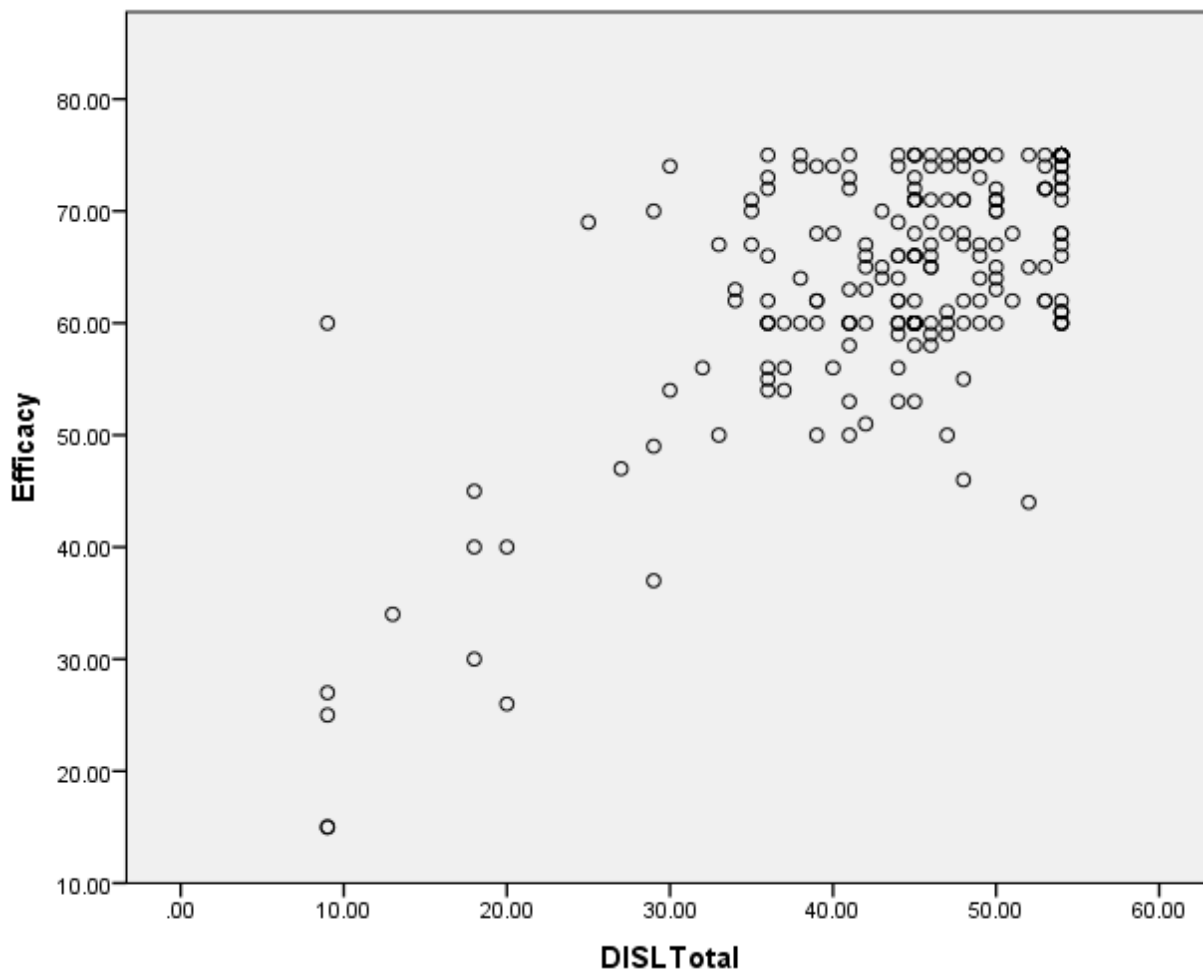
Figure 2. Scatter plot showing the correlation between DISL and DDDM efficacy.

To graphically represent the correlation between DISL and DDDM anxiety, the researcher constructed a scatter plot to demonstrate the relationship between the DISL scores and the DDDM anxiety scores (see Figure 3). Upon examination, the scatterplot shows that the data points are widely spread, indicating no relationship between the two variables. It should be noted that there is a lot of variability in anxiety at each level of data-driven instructional leadership.
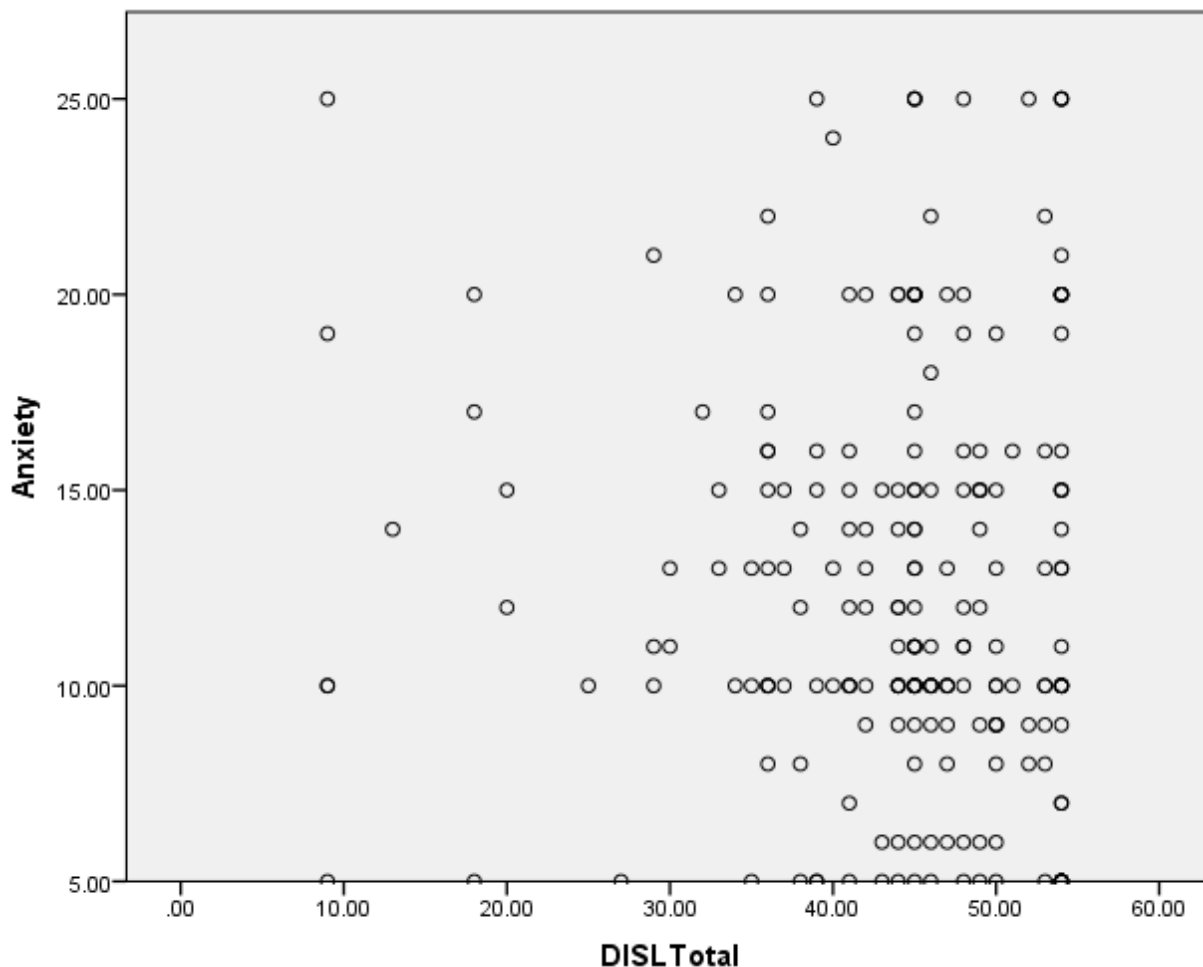
Figure 3. Scatter plot showing the correlation between DISL and DDDM anxiety.

Multiple regression analyses. Following the correlational analyses, the researcher

conducted multiple regression analyses using the variables of DISL, DDDM efficacy, school

level, and DDDM anxiety to address research question three. The first multiple regression

analysis utilized the DDDM efficacy score as the criterion variable, the DISL score as the

predictor variable, and school level as the control variable to see what percentage of variability in

teacher sense of DDDM efficacy can be explained by data-informed school leadership and

school level.

The results for the regression of DDDM efficacy on DISL and school level resulted in the

prediction equation: DDDM efficacy (predicted) = 29.798 + .770 (DISL) + .561 (school level).

DISL was a significant predictor ($t = 13.617$, $p < .001$) in the equation; however, school level

was not significant ($t = .516$, $p = .606$). The standardized regression coefficients were .682 for

DISL and .026 for school level showing importance of DISL in equation and almost no

contribution from school level (see Table 14). The coefficient of determination, R^2, of .463 was

significant ($F = 92.935$, $p < .001$). The adjusted R^2 of .458 that compensates for the positive bias

indicates that approximately 46% of the variability of DDDM efficacy can be explained by DISL

and school level, with DISL contributing more to this explanation (see Table 14).

Table 14

Regression of DDDM Efficacy on DISL and School Level

	N	B	SE	β	t	p
Data-Informed School Leadership (DISL)	219	.770	.057	.682	13.617	.000
School Level	219	.561	1.086	.026	.516	.606
Constant	219	29.798	2.666		11.175	.000

The researcher conducted a second multiple regression analysis using the following three

variables: DISL, school level, and DDDM anxiety. The multiple regression analysis utilized

DDDM anxiety as the criterion variable, DISL as the predictor variable, and school level as the

control variable to address research question three that examined the potential relationship

between teachers' perceptions of data-driven school leadership and teacher sense of self-efficacy

and anxiety for data-driven decision-making (see Table 15).

The results for the regression of DDDM anxiety on DISL and school level resulted in the

prediction equation: DDDM anxiety (predicted) = 14.829 - .041 (DISL) - .903 (school level).

Neither DISL ($t = -1.056$, $p = .292$) nor school level ($t = -1.225$, $p = .222$) are significant

predictors of DDDM anxiety. The standardized regression coefficients of DISL ($β = -.072$) and

school level ($β = -.083$) show very limited contribution from both DISL and school level in terms

of explaining DDDM anxiety (see Table 15). The coefficient of determination, R^2, of .011 was

not significant ($F = 1.205$, $p = .302$). The adjusted $R^2 = .002$ compensates for the positive bias,

indicating that approximately almost no variability in DDDM anxiety can be explained by DISL

and school level.

Table 15

Regression of DDM Anxiety on DISL and School Level

	N	B	SE	β	t	p
Data-Informed School Leadership (DISL)	219	-.041	.038	-.072	-1.056	.292
School Level	219	-.903	.737	-.083	-1.225	.222
Constant	219	14.829	1.810		8.194	.000

Chapter Summary

The purpose of the study was to ascertain the relationship between the teachers'

perception of data-driven instructional leadership and their sense of self-efficacy and anxiety

towards data-driven decision-making. A further purpose of this research study was to examine

teachers' sense of self-efficacy and anxiety across elementary and secondary school levels. Due

to the expectation of classroom teachers' level of integration of DDDM throughout the United

States, particularly in the state of Georgia, the instructional characteristics of a principal that

contribute to higher levels of teachers' self-efficacy on data-driven decision-making and low

anxiety was paramount.

The data that the researcher gathered in the study indicated that the majority of teacher

respondents "Agree" or "Strongly Agree" that their principals are providing data-driven

instructional leadership in their schools. The majority of teachers also "Agree or "Strongly

Agree" to being confident in accessing data to make informed decisions for instruction relating

to students' needs. Overall, the results showed that the majority of teacher respondents

demonstrated higher levels of DDDM efficacy than DDDM anxiety; however, teachers did

report anxiety with respect to being intimidated by statistics and interpretation of standardized assessments. When comparing the responses of elementary and secondary level teachers, secondary teachers have slightly lower DDDM anxiety levels as opposed to elementary teachers. The results of the correlational analysis demonstrated a strong positive relationship indicating that those with higher DISL scores tended to report higher DDDM efficacy. The results of the correlational analysis also demonstrated that there was no significant relationship between DISL scores and DDDM anxiety. Finally, multiple regression analyses revealed that data-driven instructional leadership (as measured by the DISL) was a significant predictor of DDDM efficacy; however, data-driven instructional leadership was not a significant predictor of DDDM anxiety. In addition, school level was not significant in either equation, reflecting similar findings at both the elementary and secondary levels.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

The American educational system focuses on improving student achievement and educational outcomes for all students regardless of socio-economic status, ethnicity, mental ability and capacity, or religious affiliation. The intense focus on educational outcomes for all students occurred with the passing of the No Child Left Behind Act in 2001, reauthorized in 2015 as the Every Student Succeeds Act. NCLB (2001) ushered in an area of accountability for schools by using mandatory testing of all students in grades three through eight, as well as individual courses at the secondary level. Subsequently, the federal government introduced the process of assessing schools' effectiveness based on standardized test scores from state-authored assessments and holding schools accountable for every student's academic success.

Due to the enactment of NCLB (2001), school systems had to put processes in place to utilize the state-authored assessment data to improve student achievement outcomes for the first time. The emergence of data as a driver of school improvement became known as data-driven decision-making. DDDM can be defined as the systematic collection of student assessment data and other related school metrics (e.g., attendance, discipline, and teacher certification) (Mandinach et al., 2015; Marsh & Farrell, 2015) and has evolved into a school reform message sweeping across the United States educational system. DDDM has a two-fold purpose: (a) to allow the teacher to adjust instruction on a student or group basis contingent upon student performance data (Rallis & MacMullen, 2000) and (b) to determine the allocation of school resources and instructional initiatives that are aimed at increasing student educational outcomes. While the DDDM process is typically viewed from the district and administration levels, few

researchers have examined the DDDM process at the school level where it is most needed (Dunn et al., 2013). The responsibility of improving student outcomes has transitioned from being solely a district-led initiative to becoming school-based initiatives with the principal as the primary decision-maker and instructional leader (Reeves et al., 2016).

The purpose of this study was to examine the relationship between teachers' perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. A further purpose of this research study was to examine teachers' sense of self-efficacy and anxiety across elementary and secondary school levels. The instructional leader now requires an understanding of effective data practices that increase student achievement and the conveying of that knowledge to school personnel; therefore, it is critical for those leading schools to understand how their data practices influence the efficacy of their teachers regarding data-driven decision making in improving student outcomes. As a result, the researcher utilized Bandura's (1977) social learning theory as the primary theoretical framework to explain concepts and provide a lens to understand the results of the current study.

To investigate the relationship between teachers' perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making and to examine teachers' sense of self-efficacy and anxiety across the elementary and secondary, the researcher developed the following research questions:

1. What are teachers' perceptions regarding data-driven instructional leadership?
2. What are teachers' self-reported self-efficacy and anxiety regarding DDDM?
3. What is the relationship between teachers' perceptions of data-driven instructional leadership, school level (elementary and secondary), and teacher sense of self-efficacy and anxiety for data-driven decision-making?

The researcher implemented a correlational research design (Creswell, 2012) in order to examine the relationship between teachers' perceptions of data-driven instructional leadership and teachers' sense of self-efficacy and anxiety for data-driven decision-making and to examine teachers' sense of self-efficacy and anxiety across elementary and secondary school levels. A total of 219 Georgia classroom teachers responded to an online survey administered via *Qualtrics*. The survey administered was composed of the following two instruments: Data-Informed School Leadership Framework (DISL) Sun et al. (2016) and the Data-driven Decision-making Efficacy and Anxiety Inventory (3D-MEA; Dunn & Dunn, 2012). The researcher input the survey results into the Statistical Package for Social Sciences in order to conduct a correlational analysis among the three variables (Creswell, 2012). Additionally, the researcher conducted a regression analyses to ascertain how teachers' perceptions on data-driven instructional leadership predict teachers' sense of self-efficacy and anxiety for DDDM. To determine the relationship between the teachers' perception of data-driven instructional leadership and teachers' sense of self-efficacy and anixety for data-driven decision-making, the researcher incorporated the school level variable into the regression analysis.

This chapter includes five sections. The first section includes an analysis of the research findings, including a discussion where the findings of the study align with the existing body of research regarding teachers' perceptions of data-driven instructional leadership and their sense of self-efficacy and anxiety for data-driven decision-making. The researcher then offers an overall conclusion to the study, followed by a discussion on the implications, the recommendations, and plans for the dissemination of the study.

Analysis of Research Findings

The major findings presented in Chapter 4 indicated that the majority of teacher

respondents reported that their principals are providing data-driven instructional leadership in their schools, that they are confident in accessing data to make informed decisions for instruction relating to students' needs and experienced low levels DDDM anxiety as it relates to being intimidated by statistics and interpreting standardized assessments. Additionally, the findings from the correlational analysis revealed that there was a strong positive relationship between DISL scores and DDDM efficacy scores; yet, there was no significant relationship between DISL scores and DDDM anxiety scores. The results from the multiple regression analyses revealed that DISL was a significant predictor of DDDM efficacy; however, school level was not a significant predictor of DDDM efficacy. Finally, DISL and school level were not significant predictors of DDDM anxiety.

Discussion of Research Findings

As the researcher discussed in Chapter 2, principals play a critical role in making policymakers' visions for data use a reality at the school and classroom levels. Principals are expected to use data to inform school improvement planning as it relates to teacher professional learning, allocation of school funds for the enrichment and instructional remediation for students and developing a school culture that is informed by and focused on the improvement of student outcomes (Levin & Datnow, 2012). In response to the need to transition accountability for improving student outcomes from being the primary responsibility of district leadership to school leadership and teachers, Georgia evaluation standards for principals and teachers have been implemented (GA DOE, 2016a) to ensure this transition.

The Georgia Leader Keys Effectiveness System (LKES; 2016a) evaluates the effectiveness of a principal. The expectation for DDDM is embedded within the LKES evaluation system with the establishment of Performance Standard One: Instructional Leadership

and Standard Three: Planning and Assessment. According to Hartsock (2014) and Jimerson and Wayman (2015), the two evaluation standards for principals are most significant. The principal is responsible for modeling data use, builing trust to fosters teachers' use of date, and provide individual support for data use to influence teachers' sense of self-efficacy to utlize data-driven decision-making when analyzing data to impact instruction. The findings of this study align with the recommendations from Levin and Datnow (2012), LKES (2016a), and Hartsock (2014), in that instructional leadership requires analyzing multiple data sources, identify teaching and learning goals, and foster a whole-school systematic approach to goal achievement by creating a climate of trust and collaboration with respect to data informing decisions.

Teachers' Perceptions of Data-driven Instructional Leadership

In a study conducted by Levin and Datnow (2012), the researchers identified the following key principal actions when implementing DDDM: (a) formulating goals that are specific to the needs of the school and community; (b) providing time for teachers to discuss data, flexibility for reteaching, and curriculum and material resources to support DDDM; (c) building human and social capital in the form of building the knowledge and skills of teachers; and, (d) creating a climate of trust and collaboration and a culture of data use.

Sergis and Sampson (2016) completed a critical analysis of 70 existing school leadership decision support systems and found that school leaders require school leadership decision support systems to consistently adhere to data-driven decision-making process and strategically plan for their schools academic and operational success. These researchers indicated that a principal must determine decisions for his or her school based on tangible data, which are the result of gathering institutional data, developing adaptive assessment systems, and monitoring school programs.

The results from this study support the findings of Levin and Datnow (2012), Sergis and Sampson (2016), and Georgia Leader Keys Effectiveness System (2016a). The findings from this study's data analyses show the summary of survey responses from all teacher respondents indicated that teachers perceived data-driven instructional leadership as being prominent in their schools. The teachers reported that data-driven instructional leadership was prominent in their schools as evidenced by principals engaging in analyzing multiple data sources to identify teaching and learning goals, fostering a whole-school systematic approach to goal achievement process, fosters collaborative knowledge construction and instructional strategy sharing, and monitors programs and instructional effectiveness based on data analysis.

Teachers' Self-reported Self-efficacy and Anxiety

According to Hoffman (2010), the findings from this study indicated that teachers need confidence to achieve high levels of self-efficacy. The research findings from this study also indicated that teachers that do not understand how to use to data to inform instructional decision-making in using data to inform instructional practices demonstrate DDDM anxiety. If teachers suffer from a lack of confidence regarding DDDM efficacy, it will likely cause elevated levels of anxiety, leading to either the lack of data use or ineffective data use. In addition, Ford et al. (2015) found that teachers in their study were reluctant to make instructional decisions based on data due to perceived low levels of self-efficacy and too little support in the form of self-efficacy development experiences. Similarly, Datnow and Hubbard (2016) observed the same findings among teachers who perceived that they lacked the needed abilities to use data. These feelings of inadequacy were associated with teachers experiencing high levels of anxiety in their endeavors to use data successfully to improve student outcomes. The inverse is found to be true regarding self-reported self-efficacy for DDDM. The findings of a study conducted by Charalambous and

Philippou (2010) indicated that a link exists between teachers' concerns and self-efficacy beliefs and using data to determine instructional decisions and examing the impact of implementing a new curricular process. The current findings support that there are significant associations between teachers' self-efficacy to use data effectively and their levels of anxiety. The findings from his study further suggest that self-efficacy is a major contributing factor in whether DDDM practices are implemented and impacts a teacher's level of anxiety with respect to using data to inform instructional decisions.

The findings of Charalambous and Philippou (2010) are supported by the findings of the currently conducted research. The results of this study corroborate the notion that there are significant associations between teachers' self-efficacy to use data effectively and their levels of anxiety. The findings from this study of teachers indicated high levels of self-reported self-efficacy for DDDM. The high levels of self-reported self-efficacy for DDDM are indicated by teachers rating their level of confidence to complete the following task as "Agree" or "Strongly Agree" at or above 80%: (a) access state results for their students, (b) select the appropriate types of data or reports they need to assess student performance, (c) understand assessment reports, (d) use assessment data to provide targeted feedback to students about their performance or progress, (e) use assessment data to identify gaps in their instructional curriculum, and (f) use data to group students with similar learning needs for instruction.

Relationship between Teachers' Perception on Data-driven Instructional Leadership, School Level, and Sense of Self-efficacy and Anxiety towards Data-driven Decision-making

Bandura's (1977) social learning theory served as the primary theoretical framework for this study and the current study supports the finding that self-efficacy beliefs are essential determinants in the acquisition of new knowledge and apply that new knowledge to differing context. Bandura (1969) found that modeling processes can assist in the development of similar

behavioral habits when given a similar situation; however, an individual's behavior is also influenced by their peers and their environment. Therefore the data-driven instructional leadership practices measured in the DISL are critical to developing teachers DDDM practices by the principal modeling the following skills: model data use, building trust to foster teachers' use of data, provides individual support for data use, and analyzing multiple data sources to identify teaching and learning goals. As noted by Bandura (1977) observational learning is the basic learning process underlying the acquisition of a new behavior and leads to modeling stimuli to be coded into images or words for memory representations that function as mediators for response retrieval and reproduction. Therefore, principals modeling DDDM practices and exhibiting high levels of DISL lead to teachers rating themselves as having high levels of DDDM efficacy, in particular, in their ability to access state reports, under assessment reports, use data to provide targeted feedback, and use data to group students. However, teachers in the study with the same building reported the principal as exhibiting high levels data-driven school leadership and still felt anxiety as it related to DDDM.

Hartsock (2014) developed a study to identify what young teachers themselves perceived as factors that impacted their data use endeavors. Leadership from principals were perceived to be imperative for meaningful data use. Moreover, Hartsock found that novice teachers displayed high levels of anxiety regarding data use as compared to in-service teachers. This is supported by the current study's finding that there is a relationship between teacher perceptions of data-driven leadership and teacher sense of self-efficacy. In terms of anxiety, Hartsock further identified a difference between the anxiety levels of novice teachers and in-service teachers. Hoppey and McLeskey (2012) indicated that a principal who has fully equipped himself or herself will be a positive and capable primary instructional leader. The principal makes sure the staff is

adequately trained and able to deal with all their responsibilities as an educator, which includes

data use and DDDM processes. This is also consistent with the current finding of this research

study that found a relationship between DISL scores and teacher sense of self-efficacy in terms

of using DDDM practices in the classroom. The principal has a considerable influence on the

self-efficacy of the teachers, especially in terms of instructional practices.

Staman et al. (2014) examined a training course whereby school teams learned to use

data from a computerized monitoring system to improve instructional quality and student

performance. Staman et al. found that these course training activities had a positive effect on the

teams' DDDM skills and DDDM knowledge. When teachers had the needed tools for practicing

DDDM, their reluctance to adopt it lessened. Dunn et al. (2013) investigated teachers' sense of

self-efficacy and their levels of anxiety regarding data use. They evaluated the effect of using

data to inform instruction on teachers' self-efficacy. The current results revealed that teachers

exhibited some concerns about using DDDM. Moreover, the teachers were also hesitant to

engage with DDDM. Dunn et al. concluded that low levels of skills and knowledge about

DDDM significantly influence the perceptions of teachers about their self-efficacy and anxiety

and that low levels of perceived self-efficacy and high levels of anxiety also affected the

perceptions and willingness of teachers to learn more about DDDM and whether they would use

DDDM in their future classrooms. In addition, White (2014) examined the effects on teacher

self-efficacy when the district provided professional development programs. The results revealed

that the teachers possessed a strong understanding of teacher self-efficacy, and that they did

exercise self-efficacy behaviors that could be related to improving the learning and teaching

process because of the professional development programs. The use of professional development

programs to be able to increase self-efficacy of teachers and decrease anxiety levels is prevalent

in the literature. This supports the finding that teacher perceptions of data-driven instructional leadership have a relationship with teacher self-efficacy. Principals are the school administrators who mostly deal with professional development programs for the teachers.

The scores for the three major variables (teachers' perceptions of data-driven instructional leadership, school level (elementary and secondary), and teacher sense of self-efficacy and anxiety for data-driven decision making) were analyzed using multiple regression analysis. The current research findings revealed that there is a positive relationship between DISL scores and teacher DDDM efficacy. The results revealed that DISL was a significant predictor of teacher DDDM efficacy. School level did not have an impact on DDDM efficacy; however, there was no significant relationship between DISL scores and teacher DDDM anxiety. DISL and school level were not significant predictors of DDDM anxiety.

Conclusions

Principals have a significant role as instructional leaders in the self-efficacy and anxiety levels of teachers. The current findings, together with the findings of previous scholars, substantiate that principals influence teachers' DDDM self-efficacy (Datnow & Hubbard, 2016; Hoffman, 2010; Mandinach & Gummer, 2013; Mitcham, 2015). This indicates that when developing and implementing DDDM strategies, the principal should lead the way and should be able to demonstrate to the teachers that they are also capable of using the new strategy (Dunn et al., 2013).

According to White (2014), the principal as the instructional leader should develop a school culture that promotes and integrates DDDM; principals should be the leaders in terms of implementing DDDM inside the classroom. Reeves et al. (2016) suggested that the principal as the instructional leaders could use DDDM practices during meetings with the teachers, which in

a sense is the principal's classroom. Additionally, the principal should exhibit characteristics of an instructional leader that would readily support the integration of DDDM in the classroom level. Reeves et al. further posited that the principal has the main responsibility of transforming each classroom to become integrated with DDDM practices because the principal is the primary decision-maker and instructional leader at the school level. The principal and his or her team of experts should serve as the primary role models for teachers when implementing DDDM practices at the classroom level.Teachers need the support of the principal to increase their self-efficacy especially when learning and implementing DDDM.

One of the ways to support teachers to implement DDDM practices inside the classroom is through professional development programs. One of the prevalent themes in the body of previous literature was the use of professional development programs to increase teacher DDDM efficacy and lower DDDM anxiety as it relates to integrating DDDM at the classroom level (Jimerson & Wayman, 2015; Marsh & Farrell, 2015; Staman, Visscher, & Luyten, 2014). Previous researchers from numerous studies have highlighted the need for professional development programs for teachers to develop, maintain, and improve skills for their instruction inside the classroom (Arthurs, 2014; Katz & Dack, 2014; White, 2014). Professional development programs also make the teachers feel confident about what they are doing (Ezzani, 2015). With proper training and workshops, teachers' self-efficacy is increased because they are prepared by professional development programs to deliver what is needed from them. Moreover, teachers are less anxious to implement new instructional strategies inside the classroom because they believe that they can implement it with confidence from professional development support.

Implications

Research seeking to understand what principal characteristics, behaviors, and practices

constitute effective data-driven instructional leadership will continue to evolve as legislators and K-12 administrators continue to address the challenges of raising student achievement and addressing teaching pedagogy to advance data-driven decision-making. Data-driven instructional is a core tenet of principal instructional leadership and a subset of principal instructional leadership that expects the principal to be well-versed in the disaggregation of student achievement data related to federal and state assessments, curriculum based assessments, non-academic student data to inform decision-making (Sun, Przybylski, & Johnson, 2016).

As evidenced by this study, principal data-driven instructional school leadership can influence the DDDM efficacy of the teachers they are responsible for leading as reported by teachers in this study. In summarizing teacher perception of data-driven instructional leadership using the Data-informed School Leadership (DISL) framework, principals should module for teachers how to engage in analyzing multiple data sources and longitudinal data to identify teaching and learning, fostering a whole-school systematic approach to the goal achievement process, fostering collaborative knowledge construction and instructional strategy sharing, and promoting teaching practices that work through regular classroom observation.

The implications from this study offer significant implications for superintendents, school boards, and school level leaders. Most teachers reported high levels of data-driven instructional leadership in their schools and high levels of DDDM efficacy; however, some teachers reported DDDM anxiety regardless if their principals adhere to data-driven instructional leadership practices. In summarizing teacher self-reported levels of DDDM efficacy and DDDM anxiety as measured by the Data-driven Decision-Making Self-Efficacy and Anxiety (3D-MEA) inventory, 25-30% of teachers were intimidated by statistics and intimidated by the task of interpreting students' state level standardized assessments. Superintendents, school boards, and school level

leaders can ensure professional development is determined by using appropriate data to address the DDDM efficacy and DDDM anxiety of teachers, especially DDDM anxiety, in the areas of statistics and interpreting standardized assessments.

The results of this study also contribute to DDDM literature. The purpose of this study was to ascertain the relationship between teachers' perception of data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. The findings revealed that there is a relationship between data-driven instructional leadership and teachers' sense of self-efficacy for DDDM.

Recommendations for Practice

First, the researcher recommends that principals should evaluate their own instructional leadership and determine whether they are modeling and implementing data-driven instructional leadership as defined by the nine practices found within the Data-informed School Leadership framework. If a principal is already implementing data-driven instructional leadership, the principal can develop systems and processes that allow for the development of DDDM culture. If a principal is not modeling and implementing the nine practices found within the Data-informed School Leadership framework, a principal should seek professional development aligned with analyzing data sources, deconstructing the standards, developing professional learning communities, and techniques for monitoring the effectiveness of programs and instructional effectiveness based on data analysis.

As instructional leaders, principals must continue to model data use, build trust to foster teachers' use of data, promote teaching practices that works through regular classroom observation, and determine staff development needs by using data. Professional development is required of all teachers and often times chosen by district and school level leaders. School

administrators should choose professional development that focuses on building the

knowledge, skills, and competencies identified in the twenty items on the 3D-MEA to continue

to raise teachers' DDDM efficacy and lower DDM anxiety.

<h2 style="text-align:center">Recommendations for Further Study</h2>

There are several studies about DDDM in the literature. The current study was a

quantitative study. Future researchers could use a mixed methods approach to provide the

advantages of both a quantitative and qualitative study. The quantitative part of the study could

identify different variables that influence teacher self-efficacy and anxiety levels in terms of

DDDM practices through teachers' interviews. The qualitative aspect of the study could

provide rich descriptions of teachers' self-efficacy and anxiety levels pertaining to data-driven

instructional leadership by surveying teachers in many school systems. This type of study

could provide both detailed insights and statistics to be able to provide evidence of the

advantages and barriers to implementing DDDM practices inside the classroom.

In the current study, the researcher focused on the perceptions of the teachers regarding

data-driven instructional leadership and its relationship to their self-efficacy and anxiety. The

research found that some teachers were anxious no matter the principal's level of data-driven

instructional leadership; future researchers can further explore or seek to identify the potential

relationship between data-driven instructional leadership and DDDM anxiety. To add to this

current study, future researchers could include the perceptions of principals as well as other

stakeholders, such as parents and students. In addition, future scholars could extend the study

be replicating the study in a state different than Georgia. The identified population of the

current study included all full-time certified educators in a rural school district located only in

the southeast United States. Future researchers could include a larger sample of teachers that

are a representative sample of teachers in the United States and Georgia. The current researcher conducted the study in a rural school district. Future investigators may include urban school district or compare the findings between rural and urban school districts. Future researchers could also administer other instruments to determine the self-efficacy and anxiety levels of teachers for DDDM.

Other quantitative research designs could also be implemented to examine the relationship between data-driven instructional leadership and their sense of self-efficacy and anxiety towards data-driven decision-making. An experimental research design could be implemented by incorporating a pre-test and post-test of self-efficacy and anxiety levels of teachers regarding DDDM could be conducted once an intervention program is introduced.

Dissemination

The Georgia Association of Education Leaders (GAEL), along with other state and national educational leadership organizations, may be interested in the findings of this study. The results provide empirical evidence with respect to the relationship between teachers' perception of data-driven instructional leadership and teacher sense of self-efficacy for data-driven decision making. The findings of this study will provide guidance during the hiring process for public and private school employers when selecting teachers, school leaders, and district personnel. The researcher will share the study's findings with educational leadership preparation programs in the hopes that a coursework will entail learning and researching best practices associated with DDDM implementation at the teacher level. This study will also be made available publicly through the Georgia Southern University Library and disseminated via online databases. In addition, the researcher will submit this study to peer-reviewed education journals and possibly other professional publications available for public view.

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APPENDIX A

DISL RELIABILITY INFORMATION

Data-Informed School Leadership (DISL)	
DISL Dimensions	**Domain Reliability**
Data-Based Goal Setting	.942
Developing Teachers' Evidence-Based Decisional Capacity	.930
Building a Data-Wise Culture	.949
Improving Instructional Programs Based on Data	.915

APPENDIX B

3D-MEA RELIABILITY INFORMATION

Data-driven Decision-Making Self-Efficacy and Anxiety Inventory (3D-MEA)			
Domain	**Domain Reliability**	**Item Reliability**	
Efficacy for Data Identification and Access	0.84	Item 1	0.67
		Item 2	0.91
		Item 3	0.89
Efficacy for Data Technology Use	0.91	Item 4	0.89
		Item 5	0.90
		Item 6	0.84
Efficacy for Data Analysis and Interpretation	0.81	Item 7	0.82
		Item 8	0.70
		Item 9	0.76
Efficacy for Application of Data to Use Instruction	0.92	Item 10	0.72
		Item 11	0.85
		Item 12	0.87
		Item 13	0.82
		Item 14	0.84
		Item 15	0.82
DDDM Anxiety	0.88	Item 16	0.74
		Item 17	0.82
		Item 18	0.84
		Item 19	0.72
		Item 20	0.81

Note: Internal consistency reliability (Cronbach's alpha) was calculated for each of the five scales by Dunn, Airola, Lo, and Garrison (2011)

APPENDIX C

SUPERINTENDENT'S STATEMENT OF PERMISSION

Research Study: *The Relationship between Teachers' Perception of Data-driven Instructional leadership and their Sense of Self-efficacy and Anxiety towards Data-driven Decision-making*
Principal Investigator: *Jarvis J. Price*
Institution: *Department of Leadership, Technology, and Human Development, College of Education, Georgia Southern University, Statesboro, Georgia 30286*

Superintendent's Statement of Permission
Human Subjects - Institutional Review Board
Georgia Southern University
P.O. Box 8005
Statesboro, GA 30460

To Whom It May Concern:

Jarvis J. Price has requested permission to collect research data from certified educators employed by the Thomaston-Upson County School System through a project entitled *The Relationship between Teachers' Perception of Data-Driven Instructional Leadership and their Sense of Self-Efficacy and Anxiety towards Data-Driven Decision-Making*. I have been informed of the purposes of the study and the nature of the research procedures. I have also been given an opportunity to ask questions of the researcher
I have reviewed the request to allow certified educators in my district to participate in the above-referenced study. I understand that participation entails completion of an online survey and that teachers will be contacted via e-mail to participate in the research study. To enable the Principal Investigator to contact teachers via e-mail, I have authorized him to obtain a list of e-mail addresses from my district. Teachers e-mail addresses will be utilized for purposes of the above referenced research study only.
My signature below indicates that I have granted permission for certified teachers in the Thomaston-Upson County School System to participate in the research study, *The Relationship between Teachers' Perception of Data-Driven Instructional leadership and their Sense of Self-Efficacy and Anxiety towards Data-Driven Decision-Making*, and that I have authorized the provision of a list e-mail addresses to the Principal Investigator.

_____   _____
(Signature of Superintendent or Designee)   (Date)
_____   _____
(Superintendent's Name or Designee, District, and District Address)   (District Name)
_____
(District Mailing Address)

APPENDIX D

GEORGIA SOUTHERN IRB APPROVAL

	Georgia Southern University	
	Office of Research Services & Sponsored Programs	
	Institutional Review Board (IRB)	
Phone: 912-478-5465		Veazey Hall 3000
		PO Box 8005
Fax: 912-478-0719	IRB@GeorgiaSouthern.edu	Statesboro, GA 30460

To: Price, Jarvis; Soares, Lina

From: Office of Research Services and Sponsored Programs
Administrative Support Office for Research Oversight Committees
(IACUC/IBC/IRB)

Approval Date: 10/6/2017

Subject: Status of Application for Approval to Utilize Human Subjects in Research
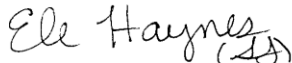

After a review of your proposed research project numbered **H18070** and titled **"The Relationship Between Teacher Perception of Data-Driven School Leadership and their Sense of Efficacy and Anxiety for Data-Driven Decision Making"** it appears that your research involves activities that do not require full approval by the Institutional Review Board (IRB) according to federal guidelines. In this research project research data will be collected anonymously.

According to the Code of Federal Regulations Title 45 Part 46, your research protocol is determined to be exempt from full review under the following exemption category(s):

B2   Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (I) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (II) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Any alteration in the terms or conditions of your involvement may alter this approval. *Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that your research, as submitted, is exempt from IRB approval. No further action or IRB oversight is required, as long as the project remains the same. If you alter the project, it is your responsibility to notify the IRB and acquire a new determination of exemption. Because this project was determined to be exempt from further IRB oversight, this project does not require an expiration date.*

Sincerely,

Eleanor Haynes
Research Integrity Officer

APPENDIX E

SURVEY INSTRUMENT

Survey

Part I
Demographic Information

	Choice 1	**Choice 2**	**Choice 3**	**Choice 4**	**Choice 5**
School Level	Elementary (Grades Pre-K – 5th)	Secondary (Grades 6th – 12th)			
Years, at the end of this school year, that you have worked with the current principal	0	2 -4	5 – 9	10 – 15	More than 15 years
Years experience as a teacher at the end of the 2017 - 2018 school year	0	2 -4	5 – 9	10 – 15	More than 15 years

Part II
Data Informed School Leadership --Teacher Survey

The purpose of this survey is to obtain information about what you think of your school leaders use data to leader schools and improve teaching and learning in schools. Please read the instructions carefully and answer each question as honestly as possible. You should be able to complete this survey in about five minutes. Your response to the questionnaire will be anonymous and will be combined with those of others to reveal patterns.

Directions: Please indicate your level of agreement with each of the following statements about your instructional leadership from Strongly Disagree to Strongly Agree.
[1= Strongly Disagree; 2 = Disagree; 3 = Somewhat Disagree; 4 = Somewhat Agree; 5 = Agree; 6 = Strongly Agree]

Data-Informed School Leadership (DISL) (9 items)								
Leadership in this school:								
1	Analyzes multiple data sources and longitudinal data to identify teaching and learning goals	1	2	3	4	5	6
2	Fosters a whole-school systematic approach to goal achievement process	1	2	3	4	5	6
3	Models data use	1	2	3	4	5	6
4	Provides individual support for data use especially through individual conferencing	1	2	3	4	5	6
5	Determines staff development needs by using data	1	2	3	4	5	6
6	Fosters collaborative knowledge construction and instructional strategy sharing	1	2	3	4	5	6
7	Builds trust to foster teachers' use of data	1	2	3	4	5	6
8	Promotes teaching practice that works through regular classroom observation	1	2	3	4	5	6
9	Monitors program and instruction effectiveness based on data analysis	1	2	3	4	5	6

Part III
Data-driven Decision-making Self-efficacy and Anxiety Inventory (3D-MEA)

This questionnaire is designed to assess the teachers' beliefs in their abilities to effectively analyze and interpret student data in order to successfully connect or apply their interpretation of data findings to class- room instruction and to improve student learning. It consists of 20 behavioral statements that describe data-driven decision-making practices and behaviors. You are asked to consider each question in terms of your confidence and aptitude to complete Read each statement carefully. Then select the choice that best fits the specific level of agreement during the past school year. For the response to each statement:

1 represents Strongly Disagree
2 represents Disagree
3 represents Neither Disagree Nor Agree
4 represents Agree
5 represents Strongly Agree

In some cases, these responses may seem awkward; use your judgment in selecting the most appropriate response to such questions. Please select only one number per question.

Data-driven Decision-Making self-efficacy and Anxiety Inventory (3D-MEA) (20 items)					
	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1. I am confident in my ability to access state assessment results for my students	1	2	3	4	5
2. I am confident that I know what types of data or reports I need to assess group performance.	1	2	3	4	5
3. I am confident that I know what types of data or reports I need to assess student performance.	1	2	3	4	5
4. I am confident I can use the tools provided by my district's data technology system to retrieve charts, tables or graphs for analysis.	1	2	3	4	5
5. I am confident I can use the tools provided by my district's data technology system to filter students into different groups for analysis.	1	2	3	4	5

6. I am confident that I can use my district's data analysis technology to access standard reports.	1	2	3	4	5
7. I am confident in my ability to understand assessment reports.	1	2	3	4	5
8. I am confident in my ability to interpret student performance from a scaled score	1	2	3	4	5
9. I am confident in my ability to interpret subtest or strand scores to determine student strengths and weaknesses in a content area and weaknesses in a content area.	1	2	3	4	5
10. I am confident that I can use data to identify students with special learning needs	1	2	3	4	5
11. I am confident that I can use data to identify gaps in student understanding of curricular concepts.	1	2	3	4	5
12. I am confident that I can use assessment data to provide targeted feedback to students about their performance or progress.	1	2	3	4	5
13. I am confident I can use assessment data to identify gaps in my instructional curriculum.	1	2	3	4	5
14. I am confident that I can use data to group students with similar learning needs for instruction.	1	2	3	4	5
15. I am confident in my ability to use data to guide my selection of targeted interventions for gaps in student understanding.	1	2	3	4	5
16. I am intimidated by statistics.	1	2	3	4	5
17. I am intimidated by the task of interpreting students'	1	2	3	4	5

state level standardized assessments.					
18. I am concerned that I will feel or look ''dumb'' when it comes to data-driven decision-making.	1	2	3	4	5
19. I am intimidated by my district's data retrieval technology.	1	2	3	4	5
20. I am intimidated by the process of connecting data analysis to my instructional practice.	1	2	3	4	5