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Professional Development Effects on Teachers' Perceptions in Analyzing and Using Student Data

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2015

Abstract

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by

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MA, Rowan University, 2005

BS, University of Scranton, 1998

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

In a school district in Southern New Jersey, teachers have struggled to analyze student district data to make informed instructional decisions. There is a demand for teachers to use data to inform instruction, but teachers often lack sufficient knowledge in data disaggregation. The purpose of this study was to note the effects of professional development (PD) on data-driven decision making practices by collecting survey data before and after participation in a training module. Guided by the theories of knowledge management (KM) and data literacy, the research questions examined teachers' perceptions on PD's impact toward using data. A quasi-experimental quantitative study was employed. Surveys on data-driven decision making were administered to 50 teachers before and after a PD session on how to analyze and use student data and modify instructional practices. ANOVA was utilized to examine mean differences. The results indicated a significant increase in teachers' perceived abilities to analyze student data and use data to modify instruction after completing PD. The results of this study suggest that implementing PD programs could help teachers effectively use data to improve instructional practices. This study contributed to social change because participants were able to increase their capacity to analyze and use student data by participating in targeted professional development. This research has significant implications for educators who are concerned with using data to increase students' academic success.

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Dedication

I dedicate the process of acquiring my doctorate degree to my son, Jared. I have become a better mom and made it through this process because looking at him on a daily basis provided me with the inspiration to reach my goals. Through my example, I pray that I have instilled in him the importance of education and a quest for knowledge. My hope is that my experiences will inspire him to pursue the benefits of a lifelong desire for learning. I want nothing but the best for him. This doctoral journey has ended. My focus will continue to center on the formative years of his education and future experiences with gaining a love of learning. He has taught me that loving someone so much can be such a drive and inspiration.

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This dissertation would not have been possible without the continued efforts of my committee of Walden professors. Dr. Javetz, committee member, held me to the highest standards during the review process. I thank her for challenging me to strive for only the best. Dr. Ionas, URR, was thorough and efficient in guiding me through the revision process and is a valued member of the Walden staff. The Lord has seen me through this dissertation and degree. I am grateful to have finished with a man that holds his faith in high regard. Dr. Ratcliffe, my chair and continual inspiration, helped to put things in perspective and reaffirmed that everything is in the Lord's timing. As William Wilberforce put it, "Our motto must continue to be perseverance. And ultimately I trust the Almighty will crown our efforts with success." Again, I am grateful to have concluded this process with the Lord at my side and Dr. Ratcliffe as my chair. Thank you also to my family and friends who have stood by me when I wanted to throw my hands up and say forget it. How bittersweet it is to look back and smile! As for my husband Greg, the name Lehman will be forever held in esteem with the Dr. in front of it. I truly believe the Lord waited for my last name to be right before I finished this degree.

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Section 1: Introduction to the Study

Introduction

There is a need to help teachers understand the processes and effects of making data-driven decisions based on the existing literature. Professional development is an ongoing learning opportunity and is a necessary component of how schools learn and use information. The problem is that teachers struggle to use data to make informed instructional decisions. In a southern New Jersey school district, teachers consistently examine and use data throughout the year for planning instruction. However, there is a need to transform the knowledge through technology-driven measures and collaborative efforts to increase teacher knowledge of data analysis and build confidence in using data to affect instructional practices. According to Abbott (2009), the U.S. Department of Education noted that having data had little effect on classroom instructional strategies. Using data effectively depends on the knowledge and confidence levels of educators who set goals and targets to monitor data. All too often, teachers make assumptions that students should have certain content masteries, and that tends to guide how they focus their instruction (Means, Padilla, DeBarger, & Bakia, 2009). This generalization only enhances the problem that gearing instruction to the whole group does not provide the differentiation needed to address student deficiencies uncovered in the test data.

Marsh, Pane, and Hamilton (2006) described data-driven decision-making as a process where school personnel collect and analyze data. Through the analysis of input, process, and outcome data, teachers can reflect and guide their instruction to help enhance student success. The means of acquiring data through computerized systems have consumed efforts of districts and states to ensure that systems are capable of

sustaining access to appropriate data. While this work has been deemed necessary, there are deficiencies in how data-informed decisions could influence education (Means et al., 2009). It is important to note students' specific deficiencies so that teachers can guide instruction based on student needs. Focused efforts are needed to enhance teachers' abilities to interpret data and make informed decisions. Marsh et al. (2006) noted that teachers are limited by the types of data available because data do not specifically identify student strengths or weaknesses. As such, the results quickly become dated. This study was designed to uncover how informed data mining could help teachers gain an understanding of specific student strengths and weaknesses.

Secretary of Education Duncan (2009) noted the importance of data processes used in schools and suggested that reform efforts can be successful when educators feel comfortable using data. Efforts to provide proper professional development in understanding statistical information are needed to help transform data into useful knowledge. The implementation of professional development can help to increase comfort levels because teachers have proper preparation, consistent support, and access to tools necessary to understand data. Through professional development, teachers can sift through data and view the information through cycles of inquiry. Feeney (2007) noted that cycles of inquiry often describe educational data as a spiral of information initiated when administrators and teachers commit to student learning through data collection and analysis. A cycle of data can be used as a tool to understand data-driven decision making.

In their yearlong study, Halverson, Grigg, Pritchett, and Thomas (2007) reviewed four schools and investigated how schools used student data to aid in decision making. Their system, Data-Driven Instructional Systems (DDIS), outlined the functions of processes in which individuals acquire data, reflect on data, make program

accommodations, solicit feedback, and test new ways to address how cycles of data can translate summative data into formative information. Researchers have outlined cycles or systems to aid in reviewing data every year (City & Murnane, 2005). Each system is exclusive and has three major components: data collection, analysis, and intervention.

When using data to drive instructional practices, teachers need to be able to make appropriate decisions that result in enhanced student success. Feeney (2007) investigated the gathering of data as the first part of the cycle and then the sorting as the next step. Sorting and making meaning from the data are where efforts can be made to guide instructional practices. Having knowledge of areas of student weakness helps teachers to plan future instruction. Through this, they can begin to make changes to provide students with instruction that links to their deficiencies, instead of teaching content that has already been mastered. If students have exhibited mastery, then teachers can adjust so that they can begin to explore concepts found in the next grade.

Technology-based data collection and analysis can help educators improve student skills to ensure that all children are given opportunities to be successful. Wayman (2005) claimed that technology-based data analysis tools represent a means to investigate a compilation of large amounts of data in order to refine decision making. While technology helps to gain access to data, educators are not adequately prepared to use computerized systems. Using data effectively can be a challenge for school staff for a variety of reasons. Educators are faced with using computer-based systems that are not necessarily user-friendly and may not produce easily discernible results (Oussena, Kim, & Clark, 2011; Wayman, Cho, & Johnson, 2007).

The continuing task for educators is to use data to design and implement instruction that encourages growth from the professional development experiences of

teachers. Wayman et al. (2007) concluded that, although access to data systems opens opportunities for data use, data users struggle with siphoning information. Therefore, professional development is needed to increase capacity. Professional development efforts should be available to all members of the school system. School leaders have an integral role in establishing and providing expectations relative to data-based decision making because they have to support teachers through professional development and allotting time to investigate data to make better informed decisions. As such, principals are also held accountable for student growth even though they are not in the classrooms.

Problem Statement

There is a demand for teachers to use data to inform instruction, but teachers do not have sufficient knowledge in data disaggregation. This study matched well with the goals of the school district where this research was conducted. The district goals outlined the need to use data so that they appropriately address the needs of students and promote learning. The district aims to monitor how data can help measure student progress, assess instructional effectiveness, and guide curriculum development. This study was developed to assess the local problem by determining teacher-perceived capacity to analyze and make informed decisions using data. This study can help to direct the district in providing further support to teachers through professional development efforts.

Data-driven decision skills used to develop confidence in data disaggregation are missing or limited in most college teacher education programs (Cromey, 2000; Heritage & Chen, 2005; Volante & Fazio, 2007). Teachers can make better informed decisions when data disaggregation is targeted to show data that are meaningful to school leaders. The following are possible factors contributing to the problem of effectively using data to

make instructional decisions: large amounts of data, underused technology, and resistance of school personnel (Park & Datnow, 2009).

The relevant variables in this study are participation in a professional development module on using data-driven decision-making tools and perceptions on analyzing and using student data and on modifying instruction. In this study, the use of professional development was the independent variable, while the two others were used as the dependent variables. Data for these variables were used to determine if teachers perceived that they enhanced their ability to disaggregate data and make data-driven decisions after attending professional development programs on data-driven decision-making tools. The aim was for teachers to enhance their data decision-making skills through professional collaboration with peers. If professional development was found to be effective, then a difference might be seen through teachers' perceived abilities to use data to make informed decisions. According to Stronge (2010), access to data does not guarantee that it is interpreted and transformed to affect classroom instruction; therefore, the focus needs to be on helping teachers gain confidence using professional development geared toward building capacity for successful data analysis.

The Nature of the Study

The purpose of this study was to examine 50 special education teachers in Grades 3 to 12 to assess changes in their perceived ability to use data-driven decision-making tools while analyzing student data before and after participation in a professional development module. The goals for this study were two-fold. One was to summarize the status of teachers' perceived ability to use data to modify instruction. The other was to determine if there was a difference in teachers' perceived ability to use data after

participating in a professional development experience exposing them to data-driven decision-making strategies. First, a pretest survey was administered to summarize teachers' perceived capacity to use data and modify instruction to make informed data-driven decisions. Then, after treatment, the posttest survey examined whether providing teachers with practical data-driven decision-making tools through a professional development experience affected their perceived efficacy in using data and enhancing their ability to modify instructional teaching and learning methods.

A quantitative one-group pre-experimental research design using pretest and posttest measures was employed in this study. A pretest survey was administered to summarize the perceived ability teachers possess to use assessment data to make data-driven decisions. Participating subjects included a population of 50 special education teachers who participated in a professional development workshop on data-driven decision-making tools while investigating computerized adaptive assessments. Prior to a professional development session, a pretest was administered to determine teachers' prior ability to work with data-based assessment results. Immediately following the professional development workshop, a posttest was administered to compare results to the pretest data. The survey, Data-Driven Assessment Measures created by McLeod (2005), was modified, with permission, to guide the quantitative nature of the study, and through statistical analysis to determine if there was a significant difference in the pretest and posttest results.

A performance measure survey instrument focusing on teachers' use of data-driven decision-making tools and teachers' perceived abilities to use data-driven practices was adapted for use in this study. I identified and selected the participants, gained

appropriate permission, coordinated the professional development training, and implemented the pretests and posttests. After the professional development training, a posttest was administered. The dependent variable for the study was teachers' perceived ability to analyze data and modify instruction in performing data disaggregation, and the independent variable was the instructional professional development module. These variables are discussed in more detail in the methodology section found in Chapter 3 of this study.

Research Questions

The research questions used for the study were as follows:

RQ1. Does professional development in data-driven decision-making change teachers' perceptions about how to analyze student data?

RQ2. Does professional development in data-driven decision-making change teachers' perceptions about how to modify instruction for students?

Hypotheses

H1. Teachers' perceived abilities to analyze data improved after participation in a professional development module.

H2. Teachers' perceived abilities to modify instruction for students using data-driven decision-making improved after participation in a professional development module.

Purpose Statement

The purpose of this study was to determine whether participation in a professional development module increased teachers' perceived abilities to analyze student data and use student data to affect student learning. Additionally, the study determined whether

professional development in data-driven decision making produced any significant changes in teachers' perceived ability to modify instruction for students. In this quantitative study, pretest and posttest perception surveys were administered to a group of 50 special education teachers for Grades 3 to12 to determine the effect of professional development on teachers' ability to analyze and use data to modify instruction. Love (2012) defined *data literacy* as "the ability to interpret and use multiple data sources effectively to improve teaching and learning" (p. 1). A desired outcome was to increase dialogue within the school community about the efforts teachers are making to use data for instructional purposes. Knowing that a teacher's capacity to use data to affect student learning can be a limitation that reduces the use of data-driven decision making (Gottfried, Ikemoto, Orr, & Lemke, 2011), this study was intended to determine whether professional development could affect teachers' perceptions to use data to affect student learning.

Grossman (2009) noted that most professional development does not include data collection on the impact professional development has on student learning. Once professional development is delivered, there is usually no specific procedure to verify whether the new knowledge gained transfers into useful practice. The purpose of this study was to note the effects of professional development by collecting data before and after participation in a professional development module.

Conceptual Framework

The most effective way to enhance student learning is for teachers to receive structured professional development that emphasizes assessment-driven instruction (Masters, de Kramer, O'Dwyer, Dash, & Russell, 2010). This study aimed to understand

whether professional development leads to an increase in teachers' perceived ability to analyze and use student data for decision making. Additionally, the study aimed to determine whether professional development in data-driven decision making produced any significant changes in teachers' ability to modify instruction for students. The concept of knowledge management (KM) is a framework that encompasses many definitions. For the purpose of this study, the process of KM was defined by Mehrabani and Shajari (2012) as "procedures that identify, create, and collect the necessary knowledge, organize the knowledge and manage the storage, and disseminate and apply the knowledge in school organizations" (p. 166). Kidwell, VanderLinde, and Johnson (2000) defined KM as "the process of transforming information and intellectual assets into enduring value" (p. 28). Relative to this study, the impact of professional development seeks to understand teachers' perceptions toward using assessments and data to make instructional decisions. As outlined in the KM process, the study examined how teachers' use of data changed after participation in professional development. Access to data, knowledge of the data, and the skills to construct meaning from the data are essential KM tools that teachers can use when looking at current research practices involving instructional decisions based on data analysis. Data and knowledge are key elements of the KM theory. Swan (2009) described how relationships exist between data that are provided in numerical form and how those raw data help educators make correlations to contextual information. How teachers acquire knowledge and use data more effectively can be directly related to the professional development received.

While KM is an important resource, schools are confronted with the impact of culture in school organizations. A culture of members willing to work together can be a

factor in the successful implementation of KM, along with the impact and use of technology. The sharing of knowledge helps to improve the efficiency, performance, and competitiveness in all types of organizations. It is necessary to make sure that professional development efforts are making an impact on how teachers use data to make informed decisions about students and student progress (Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009). Studies encourage KM because schools are dealing with complex information found in online databases. There is a need for schools to capitalize on the ability to search for, store, duplicate, and apply information in order to gather knowledge. This study responded to this need by determining whether professional development modules could be used to train teachers to effectively analyze student data and appropriately use student data to affect student learning. Knowledge management uses data-driven processes to discover hidden messages, examples, and information found in large quantities of data and aids in building capacity to later disseminate information.

Baker (2011) linked educational data mining with knowledge and the management of data through several technical methods of learning goals. The following goals defined his research:

1. Data allow teachers to make future learning predictions by creating data arrays that integrate information from disseminated data.
2. The clustering of various data points can allow teachers to group students based on their learning strengths and weaknesses.
3. Computer-based software supports learning through the viewing of reoccurring patterns in student assessment data.

4. Knowledge management strategies enable teachers to recognize and catalog features in online data displays.

Knowledge management is closely linked to technology. With technology, educators can access, analyze, and review data. This process also connects with the concept of data mining (defined earlier and in the definitions section). Hannum (2001) considered how schools and institutions acquired knowledge and then addressed how individual knowledge is made known to others. The sharing of knowledge is the key in the data disaggregation process. Multiple stakeholders in an organization viewing data are needed in order to share expertise and trends in data through targeted analysis and data focus groups. Once knowledge is acquired, it needs to be shared through a supportive culture of educators who can communicate openly with one another.

Data Literacy

Another key concept for this study is *data literacy*, defined as the ability to read and understand data. As suggested by Earl and Katz (2002), an inquiry habit of mind is the prerequisite to data literacy, and both increase an educator's capability to use data-driven decision making. Earl and Katz defined an *inquiry habit of mind* as "a way of thinking that is a dynamic iterative system with feedback loops that organizes ideas towards clearer directions and decisions and draws on or seeks out information as the participants move closer and closer to understanding some phenomenon" (p. 14). Earl and Katz also identified five particular knowledge and skill characteristics that are present in a data-literate leader: (a) thinks about purpose, (b) recognizes sound and unsound data, (c) possesses knowledge about statistical and measurement concepts, (d)

makes interpretation paramount, and (e) pays attention to reporting out to targeted audiences.

As stated by Earl and Katz (2002), defining the purpose for looking at the data is the first step in data-driven decision making. Setting a goal means posing a question or defining a problem. When specific goals are set, educators are able to collect the data most suited for that purpose. An educator's ability to focus data examination in relation to a particular problem or question provides a purpose that helps improve his or her data literacy (Holcomb, 2001; Love, 2004). Using the essential questions as a lens through which data can be viewed purposefully also helps to increase the confidence of educators who are challenged by data-driven decision making (Lachat & Smith, 2004; Lachat, Williams, & Smith, 2006). After determining the purpose, it also becomes easier to distinguish between sound and unsound data, because it cannot be assumed that all data are valid and accurate (Earl & Katz, 2002). At this point, the importance of high-quality data is emphasized (Heritage & Yeagley, 2005; Marsh et al., 2006).

After identifying the purpose and obtaining sound data, the next step is to use statistical and measurement concepts to properly analyze data. For educators, understanding basic concepts such as variation, distribution, mean, sampling, and aggregation is essential (Confrey & Makar, 2005; Hammerman & Rubin, 2003; Mandinach, Honey, & Light, 2006). The data then need to be interpreted by "formulating possibilities, developing convincing arguments, locating logical flaws and establishing a feasible and defensible notion of what the data represent" (p. 19). Datnow, Park, and Wholstetter (2007) suggested the use of structured protocols to identify trends and patterns within the data, and then to interpret these trends and draw conclusions. Lastly,

data literacy requires the ability to report and communicate the results of the data analysis, conclusions, and implications for different audiences (Earl & Katz, 2002). In relation to this study, several of these data literacy skills have been addressed and are discussed in the succeeding chapters.

Definition of Terms

Achievement gap: In education, the gap refers to a discrepancy in scores and/or levels of achievement between different groups of students with reference to race, ethnicity, gender, socioeconomic status, or special education populations, predominately identified through the viewing of disaggregated test data (Engle, 2010, p. 1).

Data acquisition: Deals with gaining knowledge of beliefs that are important in people's lives. In relation to education, it is the beliefs that help teachers gain a greater understanding of data based on acquiring knowledge and using that knowledge to shape further data disaggregation (Bernhardt, 2006).

Data-based decision making (DDMM): DDDM in education refers to "teachers, principals, and administrators, systematically collecting and analyzing various types of data, including input, process, outcome and satisfaction data, to guide a range of decisions to help improve the success of students and schools" (Hamilton et al., 2009, p. 46).

Data capacity: The ability to access, understand, and use data available with a strong connection to organizational structures and technology resources at maximum levels (Stid, O'Neill, & Colby, 2009).

Data culture: Occurs when an organization roots itself in continuous improvement through meeting consistently and investigating data (Ronka, 2007).

Data mining: The practice of searching for hidden relationships and patterns in data (Streifer & Schumann, 2005, p. 284).

Data inquiry: The practice of asking questions and investigating possible answers or justifying reasons for a variety of topics (Yeomans, 2011).

Data literacy: Data literacy refers to the ability to read and understand data (Earl & Katz, 2002).

Differentiation: Differentiation is the ability for educators to tailor their instruction to meet the diverse needs of the students in their classroom. This method allows teachers to maximize student growth by addressing individual needs of students in the same class by addressing content based on where the student currently ranks in relation to content mastery or lack thereof (Algozzine & Anderson, 2007).

Data continuum framework: Involves cycles used to collect, organize, analyze, summarize, synthesize, and prioritize data. A framework is created and "grounded within the context of the classroom, school, and district, all of which use different data in different ways to make decisions" (Mandinach et al., 2006, p. 8).

Feedback cycle: A process that takes information from a particular occurrence and uses the information for subsequent revisions. One event is said to cause another form of inquiry to be established. It is often referred to as a *looping cycle* (Boudette & Steele, 2007).

High-quality professional development: Involves educators engaging in learning that is valuable in improving student learning outcomes (Allen, 2005).

Knowledge management: This system looks at information while transforming and cataloging it to make personal meanings from its contents. Additionally, it is a

discipline that enables teams, individuals, and school-based organizations the ability to systemically create, share, and apply knowledge to meet school objectives (Lang, Hall, & Landrum, 2010; Mary, 2009).

Northwest Evaluation Association Assessments, Measures of Academic Progress Test (NWEA, MAP): NWEA is the company that creates assessments. The MAP tests are state-aligned, computerized, adaptive tests administered at least three times each year. MAP tests automatically adjust the difficulty level of each question based on the answer given to the previous question (NWEA, 2012).

Professional learning communities (PLCs): Groups of teachers, administrators, and support staff who work together in teams to address school, district, and state initiatives while focusing on ways to improve student learning through collaborative discussion, professional development, and continued reflection sessions (Blanton & Perez, 2011).

Scaffolding: An instructional process that provides support for beginning learners by breaking down complex tasks while gradually building knowledge, skills, and confidence to revisit tasks with greater independence during future encounters (Holton & Clarke, 2006).

Assumptions, Limitations, Scope, and Delimitations

While conducting the study, the assumptions were that participants would be honest in their responses to survey questions regarding data-driven decision making, notwithstanding that I was also an administrator in their district. It was also assumed that teachers had access to reported data through student files and computer databases.

Teachers could compare test data from the fall assessments to note growth or regression in the mid and spring assessments.

Pretest surveys were administered to teachers prior to a professional development module. The participants were all special education teachers in Grades 3 to 12 because the district only funds the MAP assessments for its special education population. The participants attended the workshop and were given both a pretest and a posttest. Generally, this immediate transition into the workshop would not be affected by the individual maturation, progress, and development of the teachers; thus, any threat due to maturation would be unlikely to affect the internal validity of this research. The survey instrument did not change from the pretest to the posttest. The internal validity of the main conclusion should not be affected because the criteria did not change.

The participants were purposely selected and assigned to the treatment. Subject-related variables were not cause for concern in this study. Age, physical size, hair color, and the like should not have caused any discrepancies. Isaac and Michael (1971) considered the threat to the external validity, more commonly known as *generalizability*, strength of the treatment, and indication of the variance of outcomes between the participants.

A pretest can often increase the scores on a posttest. While that is noted, this study aimed to uncover whether the participants perceived a change in their abilities to use assessments and data to inform decisions after participating in a professional development program. This study could be generalized to other populations of teachers, especially those who use computerized assessments. Northwest Evaluation Association offers assessments to students online. The results from this form of testing can be

compared to normative data and later generalized to schools that use these computerized assessments.

This study focused on identifying teachers' perceived abilities concerning the use of assessment data to inform decisions that affect classroom practices and instruction in a school district in Grades 3 to 12. The data-driven processes teachers engage in were measured using a survey instrument designed specifically to assess teachers' perceptions about how to analyze student data and how to modify instruction for students as a result.

The Significance of the Study

The Race to the Top and No Child Left Behind raise awareness of the need to improve the success of at-risk children and to close the achievement gap for all children. Parsen, Duerr, and Minster (2010) noted that data analysis could help educators make changes to help students meet the rising standards of education. These changes will individually affect teachers and students by creating changes in instructional practices while enhancing the overall functioning of schools to meet the needs of students academically. This study was significant in that it had the potential to determine if teacher perceptions of data disaggregation change to enable teachers to more effectively use data for instructional planning and teaching. Collaboration and inquiry can be established in the planning of classroom instructional lessons using differentiated approaches, resulting in advances in student learning. This study aimed to provide information that could be used to increase perceived teacher capacity by looking at data with the purpose of changing instructional practices to positively affect student learning. This, in turn, could help bring social change to schools by maximizing data-driven decision-making

processes through professional development efforts, which can then affect teacher instructional strategies and link to student success.

Implications for Social Change

An educator needs to capitalize on student strengths, overcome student deficiencies, and find ways to differentiate the curriculum so that all students have the opportunity to experience success. The diligent collaboration of teachers engaged in data mining provides a solid ground to make lasting change and growth within the classroom, school, and system. The manner in which educators plan instruction and deliver instruction relates to the big picture of how social change will occur. This study helped to promote the worth, capacity, and development of individuals who sought to use professional development tools to make meaning from data and use the findings to impact classroom instruction and learning. Social change efforts are typically driven from within an organization. In this study, it was significant for teachers to feel confident about their abilities with delving into data-driven reform.

Summary

Schools have access to data, but teachers lack the capacity to use data properly and to make informed decisions that will positively affect educational institutions. Professional development is seen as a means to educate teachers through collaborative efforts to inform, guide, and share strategies. The study aimed to note the differences in teachers' perceived abilities to participate in data practices learned through a professional development module. Because much of the data available in schools are computerized, the professional development module focused on also using computer-based student adaptive assessments. Key components of increasing one's ability to use data are

grounded in the leadership present in educational settings. The literature review in Section 2 addresses effective leadership, best practices relative to data-driven decision-making, guidelines of the No Child Left Behind Act and its considerations for using data in schools, roadblocks that inhibit successful data-driven efforts, and improvements in teacher performance through professional development efforts. Section 3 describes the research design, instrumentation, and methodology. Section 4 includes the presentation of findings and analysis of data. The interpretations, their implications for social change, and recommendations are found in Section 5.

Section 2: Literature Review

This review of literature supports the need and demand for schools to be better informed in the application of data-driven decision making. Further, the study sought to understand the impact of professional development for teachers who participated in professional development modules. The review also describes how states are holding teachers and schools accountable for levels of student learning. The increasing necessity to use technology to analyze an overwhelming amount of data requires educators to understand the impact of technological advancements. Leaders must now equip themselves with the necessary skills to use data-driven decision-making (DDDM) techniques and must provide teachers with the appropriate support for successful analysis of student data. The literature review also covers case studies in which researchers investigated schools using data-driven procedures. The use of technology and data-based efforts will be highlighted. Additional research was conducted that outlined various problems associated with data-based decision making and professional development. The final key area noted here are the gaps that exist in the literature.

The organization of this literature review collectively addresses the research that is relevant to identifying key data needed for disaggregation, aligning professional development efforts with teacher needs, using technology and various data systems to manage data, and reviewing strategies to overcome roadblocks associated with data review and capacity. Searching the literature involved the key words *data-driven decision making*, *professional development*, *data usage for instructional purposes*, *technology and data systems usage*, and *leadership involvement with data*. Dissertations were also reviewed to gain an understanding of previous research. The problem, as stated earlier, is

that teachers are lacking the skills to analyze data to properly transform data for instructional purposes. Therefore, the first research question aimed to determine if professional development efforts changed teachers' perceptions about how to analyze and use student data. A key component of the literature review addressed professional development and data use. Much of the research noted emphasizes the need for organizations to collaborate to use knowledge gained from data to manage instructional decision making. The second research question focused on teachers' perceptions about their ability to modify instruction based on data. In this review, research is presented noting strategies schools use when they engage in instructional enhancements using data.

NCLB, Elementary and Secondary Education Act, and DDDM

Schools are faced with the task of making informed decisions and publicly sharing outcomes. Mandates and regulations require teachers and schools to use data to identify areas of need. According to Datnow et al. (2007), the No Child Left Behind Act (NCLB) requires teachers to use data so that they can make informed decisions for educationally related purposes. The standards reform movement emphasizes the importance of assuring that all students gain an understanding of a wide range of content covered in the curricula. A significant problem with this requirement has been observed in that there are too many standards and not all of them are assessed on state tests (Brown & Hirschfeld, 2008).

To target needed instructional changes, teachers must begin to focus their efforts on what available data say about which standards are the most relevant. NCLB dictates that teachers use these data to inform their instruction. If teachers can identify high-priority standards that have been targeted on recent tests, then they can gear heightened

instructional time in those areas. This can cause educators to teach for testing, and not for a holistic understanding of a subject. Wiggins and McTighe (2007) stated that this phenomenon causes great stress and angst among teachers who are concerned about being scrutinized for their students' test scores. At times, there is not a prescriptive direction, procedure, or flow chart guiding enhancement of student proficiencies. The data component adds competency to longitudinally track the educational efficacy of students and teachers (Data Quality Campaign, 2009). NCLB will continually maintain the accountability factor, but data reporting systems and use of analysis can be the means for teachers to ensure that all their students can succeed and reach beyond the basic proficiencies needed to meet NCLB demands.

Across the nation, schools are continually scrutinized to measure how well students are meeting the requirements of NCLB. Just as students are at varying levels of competency with regard to content knowledge, so are teachers at varying levels in their ability to use data to inform decision-making processes. To enhance the success of all children, schools must build the capacity of educators to use data analysis to target instructional changes. Currently, there is a need to build competency levels for all teachers in relation to the data-driven decisions intended to enhance student success (Miller, 2010).

Over time, Kanstoroom and Osberg (2008) noted, the U.S. Department of Education negotiated with states; it is making adjustments to account for schools that are still "in need of improvement." Now, lawmakers are revamping NCLB regulations, eliminating the notion of adequate yearly progress (AYP) but still requiring schools and states to develop their own accountability systems (Burke & Heritage, 2012). In

eliminating the AYP standard, schools, under the new legislation of the Student Success Act (SSA), will still require data disaggregation by subgroup (Burke & Heritage, 2012).

States are responsible for measuring student achievement on standardized tests. Prior to the yearly test, teachers remain responsible for monitoring student progress. Many constituents in a school district are responsible for being part of a continual process of data investigation. School officials must follow through in developing steps to address the trends that data show. The data process begins with inquiry, where collaboration is essential. Information helps educators to make instructional decisions to improve student learning and success on standardized tests (Tomlinson, 2006). The requirements of NCLB have had a tremendous impact on the data-driven decisions that take place in schools. Case studies (Kerr, Ikemoto, Darliek, & Barney, 2006) have outlined how progress can be made by using data to drive instruction. Teachers work together to examine trends to increase the effective management of the knowledge obtained from data (Love, Stiles, Mundry, & DiRanna, 2008). Educators must be successful in using informal assessments to evaluate student proficiency.

Standardized tests measure students at only one particular point in the year, and therefore it is critical to use informal assessments to provide ongoing snapshots of how students are doing prior to the standardized test. LaRocque (2007) maintained that teachers closed the gaps on their Florida comprehensive achievement test (FCAT) among their students when they looked at formative test data. This formative measure was most effective as a progression rather than waiting over a longer period. The identification of corrective action showed the need for immediate action. LaRocque (2007) noted how schools are reliant on identifying strategies for students who fall behind in academic achievement prior to waiting for the standardized test.

Symonds (2004) conducted a study in 32 K-8 schools in the San Francisco area. The study showed that the lowest performing school received professional development several times a month with the purpose of engaging teachers in data analysis and instructional practices. The other schools received less time for professional development and data analysis. The report showed that efforts to support teachers participating in data-driven professional development were more effective in schools that had larger achievement gaps.

Quint, Sepanik, and Smith (2008) suggested that formative assessments alone should not be used to gauge decision making in the classroom. This leads to a systems-based approach, which is another method to link theory to results. Multiple factors, such as demographics and learning styles, can affect student performance. The nature of school, how it is viewed, its past successes, and school test data indicate how the system can affect decision making. Previous research identified teacher knowledge of data-driven decision making as a key relationship.

The pressures imposed by NCLB and the more recent blueprint for reform through the ESEA attempt to hold schools accountable for student success. These efforts heighten the need for schools to focus clearly on the use of data in monitoring student progress. State tests are only one measure. Schools also need to track student progress through continuous assessments. Teachers must rely significantly on student data to bring each student to the desired achievement level.

The Blueprint for Reform established through the U.S. Department of Education (2010) addressed some of the critical aspects of NCLB and addressed areas of change. High-stakes testing is still a focus under ESEA, but emphasis is more on student growth as opposed to proficiency levels. Some areas of the Blueprint for Reform are more

important than others. One aspect of great importance is how student progress is measured and monitored with data (U.S. Department of Education, 2010). With the blueprint, student achievement is assessed through performance targets based on common state standard assessments rather than individual state-administered tests.

Knowledge Management's Shift from Businesses to Schools

Previous research has linked KM to productivity in organizations in the business sector. Recently, attention has shifted to how KM can be used in school settings. Beginning in the early 1990s, businesses began to rely on data-based knowledge to bolster business practices and revenues. Schools also have gathered data since the 1990s. The technology age has increased the ability to capture, store, and retrieve key pieces of information. Petries and Guiney (2002) identified four steps that schools can take to employ knowledge management principles: (a) assessment of the availability of information, (b) determination of necessary information, (c) operation within an organizational framework, and (d) assessment of the school's culture and organizational structure. KM not only helps increase collaboration in the decision-making process, but also encourages teachers to build capacity to use data through information sharing.

Asian cultures reflect an understanding that effective knowledge sharing depends more on a natural relationship among people than just being able to extract information from databases (Yiu & Lin, 2002). Knowledge is embedded in the transfer of information between people. KM must rely on people. Without people, knowledge could not be created, processed, interpreted, or transferred. According to Lang et al. (2010), data, information, and knowledge are the critical aspects of KM theory. Knowledge takes time

to master, and people working together can help each other make sense of different forms of information.

The KM system approach uses both explicit and implicit strategies to guide educators in the data inquiry process. Explicit knowledge contains documents, raw facts, and other information obtained. Implicit knowledge is subjective. According to Swan (2009), it is shaped around the "know-how in people's heads" (p. 3). Groups need to tap into the explicit and implicit knowledge each group member brings to the group dynamics.

Perception Data's Link to DDDM

Schools use varied approaches to understand student and teacher perceptions. Questionnaires, focus groups, and interviews are three common ways to capture perception data. Of the information listed above, "questionnaires may be the best way to assess perceptions because they can be completed anonymously and re-administered to assess changes in individuals' experiences and thinking, over time" (Bernhardt, 2010, p. 2). Data analysis can provide information for schools to understand what staff members need to do to improve learning for all students. In a study conducted by Jones and Egley (2006), perceptions about effective data disaggregation varied. Administrators wanted teachers to use data to increase test scores, while teachers used data to enhance student learning.

Professional development efforts can help teachers determine if their perceptions match reality. Killion (2006) noted that professional development focused on skills and knowledge to support teachers by determining whether their instructional role is perceived to result in higher student achievement. This study aimed to ascertain how

professional development could enhance teachers' perceived abilities to analyze and use data to modify instruction protocols. The purpose of the posttest survey was to discover teachers' perceptions about how their ability to analyze and use data changed after participation in a professional development module. Beliefs and understandings about the success of students can be supported by disaggregation of data. For teachers' perceptions about student achievement to match reality, hard data are needed to support instructional changes.

Schools Using Data to Plan Instructional Enhancements

The process of using performance data to improve instruction allows educators to target key areas in managing instructional efforts. Some districts, including Chicago, made intensive use of data from state-mandated tests, disaggregated by school categories and specific student groupings. The synthesis reviewed detailed objectives or skills in addition to overall scores. In several schools in Chicago, Diamond and Cooper (2007) found that school constituents maintained a diligent awareness of accountability linked to testing outcomes. The testing data helped teachers and administrators effectively plan and disperse needed resources. They also found that test preparation practices became a targeted aspect in the prominently tested areas. The data-driven planning of future instruction influenced future success.

Data analysis is necessary for the monitoring and accountability of the instructional learning that teachers project to their students. Kerr et al. (2006) focused on three urban school districts and their instructional practices in using data investigation. Their findings provided a positive outlook for the successful use of data in schools. The researchers detailed in reports how teachers had access to multiple forms of data, which

encouraged disaggregation. It was noted that the staff extensively investigated previously identified areas of particular weakness, by reviewing ongoing cycles of data.

Kerr et al. (2006) and Diamond and Cooper (2007) conducted exploratory case studies that looked at data users and data-driven decision-making approaches. While studies vary in approach, it is important to note that data-driven decision making can range from simple to complex levels of disaggregation. Data can vary by the way they are collected and the way they are represented over time. The frequency of review and comprehensiveness of the analysis of aggregated versus disaggregated forms is important and should be examined.

Teachers who create a focused direction for change incorporate a set of clearly defined goals. With the knowledge that students are at different levels, by viewing achievement data, teachers can monitor and modify instructional content to compensate for skill deficits. Dahlin, Xiang, Durant, and Cronin (2010) suggested that teachers look closely at *bubble students* or those students whose proficiency level scores are closely below or above passing score; schools contend that these students can benefit the most from compensating for skill deficits. These students can make or break proficiency leveling because their previous score(s) are very close to the passing score for proficiency. Concentration of efforts to address marginal learning deficiencies in these "close call" instances can yield effective results. However, Landauer, Lochbaum, and Dooley (2009) cautioned that teachers also need to pay attention to both ends of the spectrum—those in the higher echelons and those in the lowest ranks. Schools becoming familiar with the use of data, and the leveling of assessments, find it easier to start with the groups that can benefit the most from targeted instructional changes (Landauer et al.,

2009). Through the cycling of changing instructional practices with students in the nonproficient levels, teachers can further help students by differentiating activities.

Teachers have viewed differentiating instruction as a method to increase student knowledge. Major components of effective differentiation include providing tasks that are interesting, fun, and valuable toward the goal of enhancing student knowledge (Williams, Swanlund, Miller, Konstantopoulos, & van der Ploeg, 2012). Differentiation is one of many effective strategies for schools focusing on data analysis efforts.

To address student deficiencies, engagement needs to be established with learners in a classroom setting. Active learning encourages the student to be a participant rather than simply relying on the teacher to make the instructional changes. Engagement may occur individually or through a network of a community of learners.

Using data to plan instruction helps teachers to identify the range of achievement levels in classrooms. When a teacher has identified how individual students are performing, appropriate adjustment to instructional needs can be made. Goals can be created for individual students, and differentiated instruction can be used to target the instruction for leveled groups. Multiple forms of data must be analyzed to plan instruction for students in all proficiency stages.

Best Practices for Collaborative Data Analysis Efforts

A school culture that supports data use for school improvement, decision-making, and resource allocation is the effective foundation needed to sustain a data analysis movement. Teachers can spearhead the analysis of data. The productivity of professional learning communities has much to do with its members and its leader. Collaborative teams must be willing and open to use data to enhance teaching and learning. The

multiple perspectives of teachers, and their varied levels of expertise, have been shown to improve student outcomes (Spillane, 2006).

The study aimed to encourage professional development to enhance data-driven decision-making skills and to provide an environment where teachers develop documented patterns of evidence of student learning. Teachers practice to restructure instruction based on proven data-driven research options. According to Earl and Katz (2006), there are three steps toward achieving improved student performance. These include (a) the use of standard scores as a starting point, (b) instilling a responsibility placed on teachers to identify weaknesses, and (c) to provide instructional devices that will better chart plans for improvement. A successful school team exhibits a shared ownership of data and the achievement levels of its students. Teachers operating in a professional learning community can develop improvement plans, cycles of inquiry, and plans for student monitoring.

Schools that operate collaboratively encourage teachers to make joint efforts for the benefit of student learning. Multiple viewpoints, as opposed to individual assessment, can provide additional insight, utilizing the collective power of problem solving (Richmond & Manokore, 2011). Vertical and unified collaboration between teachers promotes the success of collecting, organizing, and sharing data. According to Darling-Hammond (2010), individual disaggregation reflected that groups of teachers could chart trends collectively over time. The data generated as a group provides teachers with a road map toward student success. Teachers are charged with the task of identifying what students already know and helping them to improve areas where they are not proficient.

Professional development encourages and highlights new information crucial to strengthening teacher skills. Once skills are enhanced, teachers have a repertoire of new

information to add to the group. Teachers who can communicate about the data are able to construct new, meaningful ways to improve instruction. Quint et al. (2008) noted that groups of teachers could provide important evidence to support those communities who participated in an organized data dissemination process to capture true success relative to student learning.

Data disaggregation causes teachers to acknowledge the need to engage in reflective thinking. However, a safe environment is needed for teachers if they are to admit willingly that they are not completely successful at participating in data based processes. How can individuals in a school get all their members to be active reflectors and participants in the data movement? The acquisition of capacity for data building is achieved by spending more time viewing and using student data among groups of teachers and their respective administrators (Richmond & Manokore, 2011). This study hoped to provide a treatment that will allow teachers the time to view and use data at the same time as colleagues and administrators. After the treatment, teachers could reflect on their abilities to engage in DDDM.

The commitment of more time and resources for training is essential if successful data analysis is to make an impact on the use of information to transform education and student scores. According to Nunnaley (2007), the greatest disadvantages to using data are the educators' lack of training and knowledge of how to disseminate and evaluate the data. School faculties must engage in tough conversations about how their teaching affects student learning. Steele and Boudett (2007) noted that when teachers begin to engage in a conversation about the data, schools begin to see a process of learning take place. The establishment and capacity of professional learning communities provides the interaction and time needed to affect the successful disaggregation of data.

Clearly defining goals is an effective strategy for teachers when planning the analysis of data. Steele and Boudett's (2007) publication related to the use of differing methodologies that can be used to investigate ways to engage with student data. Through an eight step process, teachers are encouraged to work together to set up goals. Members build up competency when they view and highlight specific types of data. Upon compilation of the data, teachers begin to build assessment literacy. Based on individual findings, teachers begin to inquire and create sharing of overviews. The delivery of instruction is scrutinized to understand how and where adjustment to the planning and delivery of teaching can produce a positive impact on students. In the final step, teachers are called to take action with data. A plan is devised in which changes can be developed. The constant monitoring is a method enabling teachers to begin to see progress of desired changes. Such constant monitoring can once again lead to another inquiry stage or assessment of the current practices and their effectiveness. The cycle helps to establish needs, and presents a foundation for prioritizing data.

A collaborative working environment will increase the success of data-driven efforts. A school culture that is consistent, pervasive, and systemic in engaging DDDM practices will process cycles of data inquiry more efficiently. Teachers, who work together, and cooperatively, can track student data from year to year. This is especially important as a student moves from one grade level to another and where there is a change in the student's teacher. A shared system of data cycling eliminates unnecessary time spent by the new teacher in determining at what level the student is performing. A collaborative atmosphere can provide teachers the comfort needed to be willing to seek help or to offer assistance.

Evaluation of Professional Development Efforts

According to Little (1987), Professional Development (PD) is "any activity that is intended to prepare paid staff members for improved performance in present or future roles in school districts" (p. 491). There are complex assortments of learning opportunities that can be considered PD, ranging from formal structured topics to informal conversations among colleagues (Desimone, 2009). PD aims to change a learner's ability to complete future tasks or increase the capacity to perform at higher levels. Key to research of PD is the consideration of what makes it effective. Effective PD links teachers' learning and knowledge gained with professional changes in instructional practice (Lieberman & Pointer Mace, 2008). The importance of learning through PD is the continual gain of knowledge and cycles of using that knowledge to gain further understanding. PD should focus primarily on collaborative efforts so that application and follow-through can be supported by all members of any organization.

With data being available for review in schools, teachers need to gain further knowledge of methods of disaggregation when making school-based decisions. Job embedded tasks lend themselves to PD offered to teachers. Addressing relevant tasks is a necessity in providing educators with opportunities to engage in systemic reform. Quick, Holzman, and Chaney (2009) supported PD that enables teachers to gain the knowledge to increase student achievement. Through collaboration, efforts to sustain knowledge gained from PD can help to form an ongoing application of instructional strategies. Effective PD allows teachers to be active participants in professional learning communities that are encouraging, job-related, instructionally guided, collaborative, and ongoing (Hunzicker, 2010). Guided by these elements, school leaders can create PD

experiences effective for all teachers. According to the United States Department of Education, 10 principles are essential to a high quality, effective PD. These are (a) focus on student learning, (b) improvement in collegial–organizational interactions, (c) respect for the leadership capacity of educators, (d) research driven, (e) development of essential strategies and technologies, (f) promotion of continuous inquiry, (g) creation of opportunities for collaborative planning, (h) requirement of substantial time, (i) must be driven by a continuous improvement plan, and (j) is based on teacher efficacy and student learning (U.S. Department of Education, 1995).

Through professional development efforts and continuous feedback, teachers and other school personnel can collect and monitor the progress of their learned skills, attitudes, and behaviors, and reflect on how those experiences impact student learning. The goal of professional development is to help educators increase student achievement. If targeted goals are not shared among school staff, teachers are less likely to transform learned behaviors into future practical experiences (King & Newmann, 2004). Key to effective professional development is consideration of the school capacity to be receptive to change.

Effective PD requires implementation of learned strategies in the classroom and through thoughtful instructional decision-making. If quality components are present in a PD plan, confidence and 'buy-in' are then critically necessary if educators are to acquire lasting results. If teachers do not understand the reasoning behind PD, there can be a lack of interest, and overall effectiveness will be compromised. If teachers have a solid understanding of the need for a topic to be taught, they are more likely to gain lasting knowledge. PD using decision-making processes, embedded with data use, enables

schools to build and increase teacher capacity, collaboration and leadership, thus improving the learned skills for teaching and learning (Hayes & Robnolt, 2007). Identifying a framework to review data can help the decision-making process.

The seminal works of Kirkpatrick (1994) presented a framework for evaluating the process and impact of business and training industry programs. His work is also applicable to the data continuum in educationally based training. He identified four main evaluation measures for professional development activities: reaction, learning, behaviors and actions, and results. Kirkpatrick (2004) established the following purposes for each of the above-mentioned measures:

> "Reaction" measures how those who participate in professional development react to it. "Learning" is established if the professional development program has changed attitudes and improved knowledge and increased skills. "Behaviors and actions" determine the extent to which behavior changed as a result of a professional development program. "Results" evaluate tangible and nontangible aspects, including measures in increased quality or achievement, or have increased the self-esteem of the participants. (pp. 4-6)

An increasing need exists for teachers and school leaders to find time to collaborate with each other to deal with reform issues that focus on using data-driven decision-making skills that inform teaching and learning. PD that effects long-term changes usually draws from the needs of individual learners and the ability to chart their progress. Enabling the time and the ability to continually scaffold and monitor learned information will help to overcome obstacles related to data inquiry.

Perception data can monitor how professional development efforts are measured. The Elementary and Secondary Education Act (ESEA) requires the gathering of data on behaviors and perceptions that show a relationship with student achievement.

Perceptions, before and after professional development, can generate data that the schools can use to identify certain variables that may need improvement to positively impact student learning. The relevant variables in this study are participation in a professional development module on using data-driven decision-making tools, perceptions on how to analyze and use student data, and on modifying instruction. In this study, the use of professional development was the independent variable while the two others were used as the dependent variables. Data for these variables were used to determine if teachers perceived they enhanced their ability to disaggregate data and make data-driven decisions after attending the professional development program on data-driven decision making tools. Systemic attempts to advance and outline modifications in perception data can be used as verification to note how schools are performing. Initial perception data can establish the foundation for a strategy needed during professional development that can later affect climate or cultural changes in schools.

Additional evidence is needed on the effectiveness of data-driven reform efforts initiated through professional development initiatives. Under the accountability demands of NCLB mandates, studies have surfaced that link perceptual data to success within learning communities of teachers participating in professional development efforts using data-driven decision-making processes. Bertrand, Roberts, and Buchanan (2006) found that professional development efforts using teams attentive to addressing specific standards were persuaded by five specific items: "professional development, collaborative teaming, data/results orientations, alignment of the curriculum, and a sense of a shared vision and belief" (p. 4).

Another example of research that investigated perceptual data was conducted in 1997 through Southwest's educational development laboratory (SEDL). Teacher and

school leaders working in professional learning communities were recruited to formulate strategies that would facilitate significant, positive changes in their schools through professional development. The research in this study concluded that participants raised as many new questions as they had answered (SEDL, 2000). Research using perceptual data on how professional development affects effective decision-making practices continues to highlight varying positions. The work of LaBombard (2009) and Kelani (2009) focused on how data initiatives were implemented and what effect professional development efforts had on increased capacity. The foundation of this study used a quantitative measure to assess teacher perceptual data on the effects of professional development. Creswell (2009) noted how quantitative methods are an effective means to determine a significant change using pre and post survey data.

This study intended to provide a professional development module that could increase teacher awareness about data-driven methods and measures. It intended to build competencies to increase capacity to use data collaboratively. Research indicated that highly relevant PD is necessary if teachers are to shift and change their thinking about DDDM. Relevant teacher PD can provide a certain, direct, and measurable impact on the achievement of students. The pre and post surveys provided this study with the data necessary to determine whether the PD provided enhanced teachers' capacity to use data to drive decision-making processes that can positively affect student achievement.

Roadblocks Relative to Technology and Data Inquiry

Teachers are asked to use collected data to help solve problems with student achievement. According to Wayman and Stringfield (2006), data cannot function without teachers being involved with informational systems. They already have much data readily

available to them, and they are not always clear where to focus attention to raise student achievement. To use DDDM effectively, goal setting is paramount. Once goals are established, teachers can then use specific questioning techniques to narrow the focus of disaggregation. DDDM has been previously termed as action research, continuous improvement, and continuous evaluation (Wagner, Feister, Resisner, Murphy, & Golan, 1997). PD in the use of these informational systems is necessary so that all stakeholders may practice skills that will help build capacity with data driven systems. Brown (2006) noted how technology, sophistication, and experience in the gathering and reporting information, has increased. Thus, an interest in using technology driven data has increased.

While availability of data can pose as a barrier to acquiring data driven results, it was noted in Mathews (2002) that regardless of having data, teachers and principals were not sure if it was the most appropriate type of data for the analysis they were asked to conduct. Interviews were used to ask six principals how they conducted decision-making process around their available data. The study concluded that even with data, principals lacked the confidence to make data based decisions (Mathews, 2002).

Researchers suggested that technology storehouses could help chart growth and success. Programs and data cataloguing systems should be accessible to teachers, so that ongoing data-driven initiatives can take place. Test scores are stored in online databases and teachers can use technology to extract information more quickly than manual measures (Means, Gallagher & Padilla, 2006). Data disaggregation work has led to an increased inquiry base. The inquiry encourages teachers to ask questions about the direction and next steps in their work, how others fared in these same situations, and what the best practices are (Jessup, 2007). Technology driven knowledge from informed data-

driven decisions is built from cycles of inquiry (Wayman, 2005). Technology provides a valuable means to accessible data. When used appropriately, data can help to transform instructional decisions. However, data alone, without the capacity for teachers to put it to good use, will not produce successful informed decisions.

Technology systems can help cut back on the time needed to search out information. To maximize the data mining process, teachers need to try various ways to run reports. Making data more manageable can make sharing information more frequent. Allen, Ort, and Schmidt (2009) contended that research needs to shift towards the questions of how educators can share information via technology and nontechnology driven means, and later work to transform educational practices. It is through this sharing of information that patterns begin to present themselves and teachers can be guided to do something with the information so that there can be some transformation of practices.

Teachers instruct students according to state aligned standards during an academic year. One roadblock can be that state testing takes place sometime in the spring and results come sometime in August. Timely feedback can promote a sense of accomplishment for students, or provide them with information on deficient skills areas. A hindering factor, according to Schildkamp and Kuiper (2009), is the considerable lag time between assessment and score results. While individual states are scoring the tests, evaluating the open-ended responses and generating reports to send to school districts, students are off enjoying summer vacation. The teachers, most likely, will not instruct those students in their classes the following year. Until state standardized tests are computer driven, the methods for scoring will, unfortunately, take time in providing feedback to students and teachers.

Electronic data storehouses can file, sort, and store information. However, the computer must be told what information needs to be stored and/or retrieved. Technology is advancing at such a rate that programs are constantly superseding teachers' knowledge of previously mastered programs, and this becomes a roadblock to instructional data reform (Kadel, 2010). Testing and assessment help in the acquisition of an understanding of student knowledge and competency. However, a considerable amount of time is spent inputting data, analyzing data, finding pockets of overarching concern, reporting the data, and then using the data to affect instructional practices. Killion (2009) noted a problematic trend among educators, in that there is no formal training in assessment literacy. If teachers are incompetent, schools will need to allocate professional development time to assist teachers in using this form of media. Unless educators are encouraged to use online databases for viewing data, they may not choose to do so of their own accord. There is not enough digital training for teachers to become skilled data investigators to the extent that they are able to transfer knowledge of the data into real classroom applications (Brookhart, 2007; Killion, 2009). Along with teachers, leaders in schools should also become more comfortable discussing and handling electronic data.

If leaders can communicate purposeful goals and priorities for faculty involvement with data based systems, staff will be more likely to embrace the data culture. When online systems such as MAPs are used in the PD, module teachers can be helped to maximize the utility of data analysis. Testing data are stored in online databases, but teachers must have the necessary skills to extract, use, and analyze the data in order to make informed decisions. Ongoing assessments, similar to the MAPs benchmarks, provide timely feedback for students and educators. When all teachers are

versed in the use of the system, data analysis can be used to guide instruction focusing on student needs. Even when a student advances to the next grade, results will be stored and can be used, longitudinally, to help future teachers monitor the student's success.

Leadership: A Factor Affecting Data-Driven Decision Making

Principals and school leaders empower teachers to build data capacity by modeling desired practices. All leaders, regardless of context, must have the capacity to make leadership a distributed effort and express a need for collaboration in a community of practice that focuses on school data to transform student achievement (Leithwood & Reihl, 2005). It is important to look at how redesigning the organization is a basic responsibility of leadership. Leadership can be the driving force to provide opportunities for teachers to engage with one another. Marzano (2007) contended that teachers are likely to be more motivated if a principal is immersed in an initiative. Patterns in data evolve, and where many people are collaborating, higher levels of data disaggregation result.

Feldman and Tung (2001) reviewed principals' capacity to effectively use data through case studies. They noted that teachers needed support to meet the needs of the data culture and the analysis of their available data. The authors used interviews, observations, and the examination of school based artifacts to conclude that principals also experienced deficiencies in the analysis of data. Feldman and Tung (2001) indicated that there is a correlation between leadership and teacher capacity: if the principal lacks the skills to be successful in data disaggregation, so too did the teachers.

In addition to being seen as a model for teachers to emulate, leaders can also identify committed teachers who are willing to ignite a movement in organizations. Principals mandate and encourage data-driven practices, and often they can use the

expertise of some highly effective lead teachers (Blankstein, Houston, & Cole, 2010). A leader with a clear purpose, direction, and vested interest in data-driven practices can help to institute a data-driven school.

Williams et al. (2007) identified leadership as a critical component in schools that outperform other schools. Their study results showed that the achievement levels are higher in schools where (a) the principal leads the school reform process, (b) where there is cultivation of the school vision, (c) leaders perform as supervisors of school improvement, (d) there is use of student data supporting instructional practices, and (e) there is provision of assistance to struggling students. Leaders, who have implemented time for teachers to understand data investigation as a priority and allocated time for professional development, should hope to see how they outperform similar schools.

A shared vision and clearly communicated expectation of data use requires that all members of the organization be active participants in the DDDM process. A reciprocal trust must exist between principal and teacher. According to Park and Datnow (2009), administrators can help support data teams, not only by welcoming new ideas, but also by encouraging teachers to share what they learn. When schools are seen as learning associations and professional communities, concentration is then centered on teachers' work as a device of reform. The role of principals in leading teachers' work in significant directions can create the circumstances needed to encourage the development of professionals within schools. Administrators can tackle improvement issues in meaningful ways by spotlighting teachers' efforts to increase learning and community within schools. According to Wayman, Brewer, and Springfield (2009), spotlighting teacher efforts and success in building data capacity, can help develop the momentum to continue to further establish heightened use of data analysis.

Leaders can promote the need for data-driven schools by building and supporting the collaborative work of others through professional development efforts. A leader, looking to use data to advance student achievement, will provide opportunities to work jointly with teachers as they hone data analysis skills. School leaders who acknowledge the importance of creating and sustaining a culture of DDDM are empowering schools in achieving the goal of improving the performance of all students.

Gaps in Current Research

The current research is quick to address how state and federal mandates should guide the data-driven decision-making processes. Accountability measures are in place to direct teachers' attention to the data that should be considered when trying to raise student achievement. What is missing is how ongoing benchmarks can help teachers connect data from state assessments with frequent teacher directed assessments. Educators used MAPS data to help teachers focus instruction by uncovering individual proficiencies and needs. Dalton (2009) stressed the need to have data analysis become a part of daily school and district based initiatives. How teachers perceive their capacity to use data varies according to the research. Fusarelli (2008) asserted that teachers' data literacy needs to be proficient in order for effective educational reforms to take place. The research noted the importance of highly effective professional development as a means to address ways in which teachers' can build capacity. What the research needs to further investigate are the reasons why most teachers have not received proper training with using data to make appropriate decisions for instructional purposes. Schools that use data appropriately have teachers that can guide learning, adjust classroom practices, and set goals to help students achieve. Studies have noted that positive effects can be seen in

schools when teachers use data-driven practices (Garcia & Rothman, 2002; Supovitz & Klein, 2003). Research needs to address how districts should evaluate and monitor the extent to which teachers are using data to guide instructional changes. Best practices in the research rely on schools assembling the data and using it to notify what changes need to take place in order to produce student success. It is noted in the research that building teacher literacy on data-driven processes is critical. However, what needs to be assessed is what to do with those teachers who are not meeting at least minimum proficiency levels to interact with student and district data. To build teacher capacity with data literacy, the research stressed the importance of teachers not only being able to view data, but having the ability to make meaning from the information that is presented and collected (Heritage & Chen, 2005; Streifer & Schumann, 2005). Additional research should focus on how schools can continue their efforts to support teachers. It is not enough to provide professional development, but it is important to make sure teachers are taking that information and using in to inform their everyday practices. If teachers are competent to use data analysis practices, schools can rely on those constituents to turn effective practices to other school personnel. Continued research should focus on additional efforts to highlight frameworks that provide teachers with necessary skills and strategies to drive data based instructional decisions. Leadership is an important factor in giving teachers confidence to build capacity to use data-driven skills to modify and plan instruction. The current research highlighted the importance of having leaders embedded in the building capacity process (Firestone & Gonzalez, 2007). In the future, additional research can capture how effective leaders build confidence in their teachers to increase their capacity to engage in data-driven decision-making processes.

Research Methodology

This pre-experimental design study attempted to link the independent variable, the professional development module, to the dependent variable, teachers' perceived abilities, as reported on the pretest and posttest perception surveys. According to Creswell (2009), a quantitative study compares a review of variable(s) before and after treatment. The study intended to see if the PD module had an impact on the perceived abilities for teachers regarding data-driven decision-making processes. Perceived abilities can be tested immediately, while over time one can watch and measure teacher implementation on what was learned from PD. The choice to complete a quantitative study was decided primarily because the study could take place in a shorter period. Having a sample size of 50 teachers also made a quantitative measure a more feasible option because survey results could provide feedback faster than from a large number of interviews. Creswell (2007) noted that post-results are intended to show the effect of a specific factor. In this study, the specific factor reviewed was the PD module, and teacher perceptions were captured immediately following the module.

Review of Related Research and Its Relationship to This Study

Other methods were considered, but the pretest posttest design was chosen because it indicated how participants did prior to and after the administration to the treatment. A posttest only design was not considered because there would be no evidence to show whether the treatment had a change effect. A cross sectional design was not employed because it would only allow collection of data all at one time. Although that cross section would provide a snapshot of the variables included in the study, it would not be able to show how the treatment affected a difference in teachers' perceptions analyzing

data. In addition, a longitudinal design was not chosen because measurements are usually taken on the variables two or more different periods. While change can be measured in the variable over time, researchers would need to use qualitative means to explain fluctuations over time. The decision to use this method is also shaped by looking at how other researchers assessed the same topic on teacher collaboration. Studies found mostly used a qualitative method.

Even though other researchers have studied the same or a relevant topic, their methods differed. Most of their methods were qualitative in nature, which affected the findings they have derived. For instance, Jenkins (2013) carried out an instrument case study design to look at the problem of inadequate training and support for teachers' utilization of student achievement data to enhance their instructional practices. Education reforms called for teachers to make use of various measures of data so that they can implement instructional decisions as well as changes in their classrooms, one of which is the utilization of professional learning communities. Jenkins (2013) sought to study the decision making process of data dissemination while teachers were engaged in professional learning communities. Utilizing the instrumental case study design, the researcher was seeking to explore the relationships and patterns among nine elementary teachers with regard to their collective problem-solving experiences as well as shared decision making. The researcher interviewed the teachers, conducted classroom observations, carried out focus group interviews, and took notes on journals. All the data gathered were analyzed using the constant comparative method. The researcher even performed triangulation to validate emerging the themes in connection to the research question. The researcher found that the use of data team collaboration benefits the

teachers. Teachers learn from each other and were able to recognize instructional needs of students faster (Jenkins, 2013). Aside from Jenkins, De Casas Szemcsa (2011) also used a qualitative method to study teacher collaboration. After assess and explore the changes effected by teacher engagement in the collaborative data team process, especially on the teachers' instructional practices in the classroom. The case study design was thought to be the best method for this researcher in determining how teachers who engaged in the data team collaboration utilized the problem-solving method to form instructional decisions. In my study, I am aiming to learn through quantitative means if collaboration through group work will affect increased perceived teacher abilities to analyze data.

According to De Casas Szemcsa (2011), teachers are starting to pay attention to the teacher professional development because they are experiencing increased pressure to ensure student achievement. The researcher claimed that teachers have limited sources to establish policies or make informed professional development decisions. Through a grounded theory research design, the researcher sought to analyze as well as evaluate the attitudes, perceptions, and self-efficacy of 7th and 8th grade public school teachers when it comes to their professional development and student achievement. The study included 63 middle school teachers. Among the 63 participants, 15 were interviewed, 28 were surveyed, while the rest were observed. Observations lead to the noting of memos. The researcher used Charmaz's strategies for analysis, which included by line coding, open coding, axial coding, and theoretical coding procedures, to determine the critical themes. The grounded theory design allowed the researcher to determine the themes of (a) discovery and renewal, (b) practical applicability supporting student development, (c) disconnection, (d) impact of external forces, (e) teachers as student guide, and (f) moral

conflict defining student achievement to characterize professional development of the teachers (De Casas Szemcsa, 2011). This study showed that while the researcher determined the themes for analysis through her coding, a specific structure existed in using Charmaz's strategies, and the categories were conceptualized prior to data collection. In reviewing this study, it shows a connection to how data literacy needs to allow teachers the ability to form interpretations that are valuable in their classrooms, and that data are not valuable if teachers are not data literate.

Another case study was designed by Barry (2011) to assess teacher collaboration. However, Barry was more focused on the collaborative inquiry of analyzing student data to plan for instruction. The researcher claimed that teachers do not have enough training to assess the instructional needs of their students using student performance data. Using an exploratory case study, the researcher explored how one elementary school located in the Northeastern United States utilized a collaborative inquiry method to carry out this function. In particular, the researcher looked at how six 3rd grade teachers and their principal made use of the collaborative inquiry to understand student performance data, determine instructional direction, and plan the instruction to be implemented. The case study also allowed the researcher to evaluate the leadership practices used by the principal while using collaborative inquiry. Because this is a case study, the researcher was able to use multiple methods to support the study's findings. The researcher interviewed the teachers and participants, observed the collaborative inquiry meetings, as well as assess various documents linked to the collaborative inquiry process. All the data gathered were analyzed through a typological analysis. The data were all triangulated to ensure validity of the emerging themes. As other studies discussed in the literature, the

researcher found that collaborative inquiry benefited the teachers and principals because it allowed them to easily identify the instructional objectives of the state through state and benchmark data. In addition, it was found that transformational leadership allowed the principal to play a critical role in the collaborative inquiry's success. This leadership style helped to facilitate professional discourse and collaborative planning among the teachers. Through collaborative inquiry, as noted in Barry's (2011) study, I am hoping to determine if similar benefits can be noted in my study as well. For example, my study aimed to determine whether or not, and to what extent, teachers perceived confidence level increased while performing data decision making when they were able to have discourse with teachers in professional learning communities.

Quezada (2012) used a qualitative case study to investigate the perceptions of school personnel with regard to how they could use student data to enhance instruction. The researcher recognized the problem that teachers, even though trained to use data driven instruction, are not using it to deliver their instruction. The case study method was deemed the most appropriate to get an in-depth understanding of why this is so. The researcher used the method to know what more teachers can do to use students' achievement data to improve instructional practices more effectively. In particular, the researcher was seeking to evaluate teachers' experiences on how they make use of data to improve their instructional practices and how these practices can lead to the implementation of smaller learning communities (SLC). As this was a case study, the researcher utilized multiple data collection instruments such as open-ended survey, a focus group interview, and a teacher-reflection protocol. Coding was the main method used for data analysis. Through this case study method, the researcher found that SLC

teachers perceived the use of students' achievement data positively and believed that it could help them plan and deliver the instructional program effectively. Quezada's study shared some common elements with my study. His study looked to review teacher perceptions and sought to determine how teachers could gain confidence in improving their instructional practices by reviewing data more efficiently.

While a majority of the studies I reviewed were conducted using a qualitative design, I chose to conduct a quantitative design with a pretest/posttest. I wanted to determine an understanding of how a treatment could affect the post-results and whether or not professional development would increase a teacher's perceived abilities to effectively analyze educational data. The qualitative studies reviewed used school data based information from online and file formats of school records and interviews to establish coding themes to support their findings. My study will aim to determine, through quantitative means, if a significant change occurred in teacher perceptions after the administration of the professional development module.

Summary

Teachers' perceptions of their ability to analyze and use data to drive decision-making are at the heart of this study. Schools are using teacher collaboration as a method to gather, view, analyze, and transfer knowledge from data in making changes to the instructional aspects in schools. Militello, Schweid, and Sireci (2010) believed that the appropriate implementation of a comprehensive program of data collection and analysis could lead to improved educational processes. Teachers are constantly prioritizing data while reflecting on previous efforts. Leadership is more of an external factor in the driving success of data. Teachers need to feel that their efforts are supported and

validated. Technology, and teacher capacity with technology use, can affect data-driven decisions. The research addresses factors that support or block success with data and decision-making processes. Many necessary prior conditions, especially professional development, should be modeled to aid teachers in building capacity to apply data-driven efforts.

Section 3: Research Method

Methodology

This section describes the quantitative methods of this study. Specifically, it describes the pre-experimental pretest/posttest design used to gather information about teachers and their perceived ability to use student data as related to a professional development module. A summary of the research design for this study follows at the conclusion on this chapter. The IRB approval number is 05-21-13-0136333.

Fifty middle school special education teachers in a Grade 3-12 setting were studied to determine if their perceptions about data use and modifications to instruction changed after undergoing a data-driven decision making professional development workshop. The study highlighted their experiences with data-driven decision-making using pretest and posttest surveys. These teachers were purposefully selected based on their membership in the special education teaching staff within a school district that administers online assessments. At this time, the district only allocated funding for special education teachers to participate in formalized data-driven efforts through the purchase of the MAPs testing for their special education students. Participants took a pretest to determine their perceived abilities to analyze and use data and modify instruction based on data-driven decision-making processes. Teachers were also surveyed after a professional development session to determine if there was any change in their perceived abilities.

Research Design

A quantitative pretest/posttest design was used to capture the perceived differences in teachers' abilities to use data and modify instructional data. Data from the

study were analyzed and described accordingly. The study was pre-experimental in nature because it aimed to determine whether an intervention—in this case, a professional development module—had an intended effect on participants in this study. Causation between a pretest and posttest can be established when an experiment is carefully designed to change X and to examine the response in Y (Moore & McCabe, 1993). The results from the pre- and posttests were reviewed to chart differences based on the professional development treatment.

This study was developed based on the need to view student data and to gain an understanding of teachers' perceptions about their abilities to use data to influence instructional practices. The literature review provided a wealth of information highlighting the need to further study ways to use assessment data to enhance classroom instruction. The research questions of this study were as follows:

RQ1. Does professional development in data-driven decision making change teachers' perceptions about how to analyze student data?

RQ2. Does professional development in data-driven decision making change teachers' perceptions about how to modify instruction for students?

The research design and approach derived logically from the problem statement. Teachers are consistent in examining and using data on a continuous basis throughout the year for planning instruction. However, there is a need to transform the knowledge through technology-driven measures and collaborative efforts. This is done in order to increase teacher knowledge of disaggregation and build confidence to use data to affect instructional practices. Research shows how professional development can increase the

ability for teachers to use data (Earl & Katz, 2006). The professional development treatment is the independent variable that aimed to address the problem.

Setting and Sample

The data gathered for this repeated-measures design were obtained from 50 special education teachers in a district setting of Grades 3 to12. Participants in this study were teachers with varied experience working with data, but all were similarly responsible for administering the Measure of Academic Progress (MAP) assessment. Purposeful sampling was used to select the participants. This form of sampling relies on engaging with people who are at the core of what is being studied. Teachers were chosen because they held vital information that would add quality to the study, in contrast to selecting a particular number of people (Creswell, 2007). These 50 teachers were purposely chosen because they were charged with looking at data for investigation purposes (Nash & Bhattacharya, 2009).

This study took place in a diverse, rural, and suburban public education school district. The district involved in this study is a pre-K-12 district located in southern New Jersey. The early primary school has students in prekindergarten through second grade. The middle elementary school houses students in Grades 3-5. The middle school is made up of students in Grades 6-8. The high school contains Grades 9-12. In addition to township residents, students from four local towns attend the high school through a sending/receiving relationship. The district employs approximately 300 full-time certified educators, with a student population of approximately 2,700. The purposeful sample produced 50 public school teachers. The sample size ($N = 50$) was selected because that was the number of special education teachers who administered computerized MAP

assessments. As part of a means to monitor and track student progress, the district was looking for ways to encourage a purposeful synthesis of computerized data. This study matched nicely with district needs. Participants varied in their use of technology, numbers of years in teaching, educational background, and subject/grade taught. The sample was limited to one district school to alleviate any difficulty in accessing participants during survey review.

Treatment

The intervention consisted of a professional development session, which I designed. As outlined in the training plan for the session, the overall goal of the session was to help the teachers effectively use existing data from assessments to change classroom instructional practices. At the start of the session, I linked the goals of the study to what the teachers already knew about the MAP assessment by asking them to identify basic terms related to the MAP. I also activated prior knowledge by soliciting comments on the participants' experiences with MAP. In doing so, I was able to identify areas where discussion and instruction were most needed.

At the same time, this procedure was intended to help the teachers define their purpose in obtaining data, which is one of the skills needed for data literacy. I also used the comments to determine the basic knowledge of the teachers about the MAP assessment, and to use those comments as a way to link the goals of the session to the participants' existing knowledge. As the session proceeded, the teachers were instructed about the actual process of accessing the reports, from logging into their NWEA Report site account to printing out the reports. The session also focused on using specific reports, such as the teacher/class report, student progress reports, class breakdowns by RIT and

goal reports, and the ASG projection and summary Reports. Teachers were instructed to review teacher-, school-, and district-level data.

The skill to distinguish between sound and unsound data was also determined. This step was meant to instruct the teachers on how to properly choose data that were in line with their purpose. Upon review of the various reports, teachers were asked to analyze the data and work with other teachers to share their findings. These two steps were applications of two more data literacy skills: proper analysis of data and reporting the results of the data analysis. The last step involved the fourth data literacy skill, interpretation data. In this case, the teachers were asked to develop plans for how they could use the learning from the session during the school year. This was done by helping the teachers identify student data useful to target growth benchmarks.

The review of benchmark data can aim to identify the effectiveness of instructional programs. The test results should also inform instruction by allowing teachers the ability to structure flexible groups and identify strategies to address individual student needs. The session was conducted using hands-on activities, as the teachers were instructed to bring copies of reports from their class or school that they analyzed during the session. I gained permission from the school district to survey the participants. The treatment was conducted during a full-day professional development session. A copy of the training plan for the session can be found in Appendix C.

Overall, teachers were exposed to several concepts through the professional development in-service. Data retrieval, assessment, student progress and growth monitoring, normative comparisons, and growth targets were key concepts discussed and modeled for teachers. Throughout the session, I addressed the following strategies: how

to track growth from one test to the next, how to set student goal targets, and how to share results with kids with user-friendly terminology. During the data analysis part of the in-service, teachers were instructed on how to read reports, pull up individual skill set results, and analyze skill sets that addressed deficient areas. During the instructional implementation part, teachers brainstormed and created lists of strategies they used or could use in the future to teach specific deficient skills.

Instrumentation and Materials

The survey questions were related to the research questions. Copies of the pre and post surveys questions can be found in Appendix B.

Validity and Reliability

The survey instrument used in this study was adapted from a published instrument on data-driven decision making from a study by McLeod. The survey, Data-Driven Decision Making, created by McLeod (2005), was modified with permission (Appendix A) to guide the quantitative nature of the study, and through statistical analysis it was used to determine if differences existed in the pretest and posttest results. The validity is also noted because this particular survey had been previously used by other researchers (McLeod, 2005; Sulser, 2006; White, 2008). McLeod's diagnostic survey was developed for use with the University of Minnesota's School Technology Leadership Initiative. The survey was first used with 11,000 teachers, administrators, and superintendents in the state of Minnesota (McLeod & Seashore, 2006). It is also important to note that two separate surveys were written: One addressed principal, and the other addressed teachers. Within the last few years, several researchers have used McLeod's surveys in their dissertations to study data-driven decision-making practices for teachers, administrators,

and superintendents (Sulser, 2006, Teigen, 2009; White, 2008). In order to verify construct validity for this current study, Cronbach's alpha tests were performed to account for internal reliability. This was also done in White's (2008) study. In addition, White identified the constructs through factor analysis. According to McMillan (2004), internal consistency is accomplished by verifying that similar content occurs in survey questioning. In Ceja (2012), it was also noted that Cronbach's alpha coefficients were calculated for the original sections of McLeod's survey. Permission has been granted to adapt the survey to conform to the pre- and posttest design of the current study (Appendix A). The instrumentations used in this study sought to discover the perceptions that teachers had before and after a professional development module, so that schools can improve on negative viewpoints and construct positive ones. The survey questioning followed the prescribed protocols for consent. White conducted a Cronbach's alpha of the four constructs of his survey. Table 1 shows the reliability scales. Each of the four constructs was analyzed to determine internal consistency using Cronbach's alpha. According to Michell and Jolley (2007), the values were determined to be in the acceptable range.

Table 1

White's Cronbach's Alpha per Construct

	White's data Cronbach's alpha
Data-driven decision making	0.80
Data-driven culture	0.77
Data supporting systems	0.77
Collaboration around data	0.76

Each member was given a permission consent form. The pretest surveys were administered following a special education meeting. The independent variable in this study, the professional development module, was conducted following the pretest. Upon completion of the session, participants were given a posttest. Each survey was numbered to ensure that participants participated in both the pretest and posttest. Both pretest and posttest survey results were run through the 13th version of the Statistical Package for Social Sciences (SPSS) software using ANOVA for analysis to compare the means of the constructs before and after the treatment. ANOVA was used to determine if there was a perceived difference in teachers' ability to analyze and use DDDM because of the implementation of the professional development module. This pre-experimental design study attempted to link the independent variable, the professional development module, to the dependent variable, teachers' perceived abilities, as reported on the pretest and posttest perception surveys. The survey questions contained relevant content that was addressed in the professional development module. The post survey results demonstrated whether there was a significant difference in a teacher's perceived ability to use data and modify instructional practices after participation in a professional development module geared toward using data-driven decision-making processes while engaging with student data. Permission was granted to use the DDDM survey through email correspondence (Appendix A) for research purposes and to make adjustments if needed to tailor to this specific study. The revised survey for this study used only original questions that related to the research questions addressed in this study in the original survey. A scale of 1-6 showing the varying degrees of agreement to the questions was used, with 1 being *strongly disagree*, 2 *moderately disagree*, 3 *slightly disagree*, 4 *slightly agree*, 5

moderately agree, and 6 *strongly agree*. There were three sections in this survey. The first two questions provided me with demographic data about years teaching and technology fluency. The second section of the survey consisted of 16 questions and addressed the first research question. The third section of the survey, also composed of 16 questions, addressed the second research question.

Data Collection and Analysis

Statistical analysis was used to determine any significant differences in the pretest and posttest scores of teachers on the data-driven decision-making survey using ANOVA. Results from the pretest and posttest are presented in tables and summaries in Chapter 4. This type of statistical analysis is appropriate when a group of people have been measured before and after a treatment (Gay, 2000). An ANOVA test was used to determine differences among the pretest and posttest results. This method is frequently used in educational studies to determine the impact of treatment interventions. In this study, the level of statistical significance between the pretest and posttest scores needs to be set at .05 to justify a significant difference. According to Cohen (1988), power analysis is justified by the level of effect sizes, alpha levels, and sample size.

Important diagnostic tests were performed to check for outliers, equal variance, normality, and model validity. If one or more of these occurred, I made corrections and reran the analysis. ANOVA tests are dependent on normally distributed data with equal variance. The equal variance established that within each pooled treatment, error terms were not too large or too small. Outliers can skew the data, and therefore they should be removed before additional diagnosis and conclusions are made.

The 13th version of SPSS was used to analyze the data. The analysis provided simple summaries about the sample and about the observations that have been made with calculated data. To complete SPSS analysis, researchers summarize statistics of the data and the participants, events, or objects they relate to (Norusis, 2008). Section II of the survey addressed the first research question. The results from pretest Questions 1-16 were compared to posttest questions to show if a significant statistical change was noticed in teachers' perceptions about how to analyze and use student data after a professional development module. Similarly, Section III of the survey was used to address the second research question. The results from pretest Questions 17-32 were compared to the posttest questions to show if a significant statistical change was noticed in teachers' perceptions about how to modify instruction for students using data-driven decision making after a professional development module.

ANOVA is analysis that compares sample means with one another to see if there is a statistically significance difference. The ANOVA is an inferential statistic that is very powerful because it can find differences among groups, if they exist. ANOVA is a measure that evaluates means differences between populations (Lodico, Spaulding, & Voegtle, 2010). ANOVA overcomes this problem because a single test is used to detect significant differences between the treatments as a whole. In addition to ANOVAs, paired-samples *t* tests were performed on the average scores for each of the items on the survey instrument to determine if there was a significant increase between the pretest and posttest score for each item. A paired-samples *t*-test is used when the two means that are being compared are related observations, such as the case in this study, where pretest and posttest scores were compared. In this study, a weighted sum was used to determine an

aggregate score. Like the ANOVA, the results of this test are used to determine whether the two means significantly differ. In particular, the *t*-value determines whether there is a significant different between the means of the same measurement that were taken under two differing conditions. For the study, the two differing conditions were before and after undergoing the professional development program.

The data collection process took place in the middle school building of the district being studied. The pretest was administered following a district-wide special education meeting. The surveys were collected and stored in a locked filing cabinet. Following the pretest, teachers experienced the professional development workshop, "Stepping Stones; The Effective Use of Data to Chart Student Needs and Progress" (Appendix C). Immediately after the professional development workshop, the posttest was administered.

Role of the Researcher

Participants were willing contributors in the study process and at any given point in time had the right to be removed from the study. Informed consent was provided to the participants, so they were mindful of their rights throughout the study. All research participants must be respected throughout the data collection process. This will guarantee the participants will not be used simply as a means to accomplish research purposes. I followed the proper protocol prior to the collection of data by informing the participants of the purpose, procedures, involvement, foreseeable risks, and discomforts associated with the study, and obtaining a written informed consent stating confidentiality and anonymity. The above prerequisites were established and, therefore, participants would not be likely to withdraw, but would have the right to withdraw full or partial participation in the study if they had chosen to do so. Privacy, confidentially, and

anonymity are also other factors that protected the participants' rights. Participant names were not associated with responses. The IRB process also helped to ensure ethical protection measures.

My current role is that of a vice-principal of a middle school in a K-12 district in New Jersey. The study took place in a middle school setting, with participants from the district in Grades 3 through 12. Prior to this position, I was a classroom teacher and middle school supervisor for 11 years, serving in different teaching assignments. Two years were spent as an elementary second grade teacher and the remainder of teaching was performed at the middle school level teaching Literacy. My duties ranged from attending district wide literacy task force meetings, holding and organizing monthly meetings, engaging in literacy based conversations with teachers, planning professional development, and coordinating marking period based benchmark assignments. Hatch (2007) often noted that if a researcher is directly connected to the environment in which the study is taking place, extra precaution should take place to eliminate any bias. Addressing what is observed and allowing the survey results to drive the findings placed me in a more reliable and less threatening position.

While familiar with the participants, I maintained a working relationship with the teachers involved. All teachers were willing participants, looking to uncover strategies to help use data to improve classroom practices. I maintained a positive attitude about the subject, expressing minimal input with regard to personal feelings about how the teachers would best function. My role as an administrator can be noted as a strength because all members could share at a level of deeper and enhanced understanding because I am connected to the team and am part of the process of viewing data (Creswell, 2009).

Summary

This section focused on the quantitative pre-experimental measures pretest/posttest design. It was reflected in the section why this choice was the most effective for looking at how teachers perceive data-driven decision-making before and after the implementation of a professional development module. The research questions clearly projected what I hoped to track throughout the remainder of the study. Gaining access to participants was presented in this section in a way that ensured ethical protection of their rights. I described my role, relationships, experiences, and bias towards the study and the participants. Participation in the study was justified and the selected members were specified. Data collection procedures, tools, and analysis were articulated for this study. The following section reveals how the research was collected, a discovery of the findings, recommendations for future research, and a further investigation into the research questions.

Section 4: Results and Discussion

The main purpose of this study was to determine whether participation in a professional development module in data-driven decision making had a significant impact on the teachers' perceived abilities to disaggregate student data and make data-driven decisions. To answer this, two research questions were investigated, namely:

RQ1. Does professional development in data-driven decision making change teachers' perceptions about how to analyze student data?

RQ2. Does professional development in data-driven decision making change teachers' perceptions about how to modify instruction for students?

From these questions, the first hypothesis was that teachers' perceived abilities to analyze data improved after participating in a professional development module. The second hypothesis stated that teachers' perceived abilities to modify instruction for students using data-driven decision making improved after participating in a professional development module. To test these hypotheses and answer the research questions, a quantitative study was conducted. This quantitative study was a pre-experimental pretest/posttest design. Participants included 50 middle school special education teachers (Grades 3 to 12) from a K-12 public education school district in New Jersey. The participants were selected purposively based on their membership in the special education teaching staff within a school district setting responsible for administering online assessments (MAP assessment). These participants were surveyed using the modified Data-Driven Assessment Measures by McLeod (2005) on two occasions: before and after participation in a professional development module, which I designed. The module entitled "Stepping Stones: The Effective Use of Data to Chart Student Needs and

Progress" was a full-day workshop and was determined to be the intervening treatment between pre and post survey results.

Based on responses to both pre and post surveys, descriptive statistics on several characteristics are presented first in the subsequent sections. These results were obtained from the first section of the survey. To evaluate the hypothesis, separate ANOVA statistical analyses were then applied to the two different sections of the survey directly concerned with the research problem: Items 1-16 for the first question and items 17-32 for the second question. Each ANOVA had perception scores as its dependent variable and the participation in the professional development module as its independent variable (treatment) and was used to determine whether there was a significant difference in the means of the pre and the post survey perception scores. The ANOVAs were performed on each item and on the general constructs (how to analyze and use student data and how to modify instructions for students) of the problem. The former was conducted to determine singular items in which teachers' perceived abilities had changed, and the latter was conducted to gain a general view on how the teachers' perceived abilities on the two constructs had changed. Results of the ANOVA tests are discussed in the next section following the descriptive statistics. Afterward, a quick check on diagnostics and model validity of the "general" ANOVA is discussed. All statistical analyses were performed at a significance level of 5%, making the probability of Type I error 0.05. The chapter ends with a summary of the obtained results.

Descriptive Statistics

Table 2 provides a summary of several characteristics of the 50 middle school special education teacher-participants in the study. More than half of the participants

(52.0%) had held their position in their school or district they were currently serving in for about 4 to 15 years. This percentage was followed by those who had held their position for over 15 years (30.0%). The rest responded that they had held their current position for only about 1 to 3 years (18.0%). Exactly half of the participants rated themselves as proficient in terms of technological fluency (50.0%). Accounting for 30.0% were those who rated themselves as nearing proficient.

Table 2

Descriptive Statistics for Middle School Special Education Teacher Respondents

Variable	Frequency	Percentage
How long have you held your position in your school or district?		
- Less than 1 year	0	0.0%
- 1–3 years	9	18.0%
- 4–15 years	26	52.0%
- More than 15 years	15	30.0%
Please rate your technology fluency.		
- Novice	5	10.0%
- Nearing proficient	15	30.0%
- Proficient	25	50.0%
- Advanced	5	10.0%

Investigating the First Research Question

The first research question examined whether professional development in data-driven decision making changed teachers' perceptions about how to analyze student data. The hypothesis for this research question stated that teachers' perceived abilities to analyze data improved after participating in the professional development module. This section contains the results of ANOVAs applied on the mean differences of pretest and posttest assessment of teachers' perceptions about how to analyze student data. These

results were used as the basis to validate the hypothesis and resolve the first research question.

Responses to each item corresponded to a 6-point Likert scale, with *strongly disagree* coded as 1 and *strongly agree* coded as 6. ANOVA was performed on each item as well as on the overall aggregate score for all of these items. The items considered in this section were those found in Section II (Questions 1–16) of the survey (see Appendix B). Moreover, diagnostic and model validity checks were performed on the latter ANOVA to determine whether the derived results are strongly reliable in general.

Table 3 shows the mean scores for each item in both pre- and posttest responses corresponding to teachers' perception of how to analyze student data. It was noticeable that the teachers increased their perception of their abilities in each of the items after participation in the professional development module. The minimum increase was found to be 0.22 for the item *I understand how using data management technologies can improve student learning outcomes*. The maximum increase was found to be 2.24 for the item *I understand how to calculate the mean, median, and normative data using MAP results for my class*. The average increase for each item was found to be 0.7975, which was almost amounting to an increase from one scale to another. Additionally, results of a paired *t*-test indicated that each of the individual differences was found to be significant at a level of 5%. An average aggregate score of 59.40 was observed for the pretest responses, while an average aggregate score of 72.16 was observed for the posttest responses. Moreover, aggregate pretest scores had more variation than aggregate posttest scores.

Table 3

Pretest and Posttest Assessment of Perception on How to Analyze and Use Student Data

Item	Pretest mean	Posttest mean	Difference
Data management tools simplify the process of analyzing data.	3.94	4.24	*0.30**
Teachers have received sufficient training on reading and understanding sources of student data.	3.40	4.08	*0.68**
Teachers have received sufficient training on reading and understanding standardized achievement data.	3.48	4.28	*0.80**
Teachers have access to information management systems (Exam View, MAPS, etc.).	4.44	4.86	*0.42**
I have received adequate training to effectively interpret and act upon student assessment results.	3.04	4.36	*1.32**
I understand how to calculate the mean, median, and normative data using MAP results for my class.	2.68	4.92	*2.24**
When distributed, data and reports are tailored to meet the needs of the particular audience.	4.78	5.02	*0.24**
I have input into the data elements that are captured in school and district data systems.	4.10	4.46	*0.36**
I have input into the reports that are created by school and district data systems.	4.14	4.62	*0.48**
I can access the information I need from school and district data systems to examine relationships that impact student learning.	3.96	4.82	*0.86**
I understand how using data management technologies can improve student learning outcomes.	5.00	5.22	*0.22**
I know how to use spreadsheets and/or other technology tools to collect and analyze student data for progress monitoring during the year.	2.06	3.72	*1.66**
My professional development has helped me use data more effectively.	2.56	4.16	*1.60**
I have a solid conceptual understanding of data-driven decision-making principles and practices.	4.00	4.72	*0.72**
I find that the data analysis provided by online assessments produces outcome data that are easy to interpret.	3.52	4.10	*0.58**
Teachers have access to a variety of student achievement data.	4.30	4.58	*0.28**
Data management tools simplify the process of analyzing data.	3.94	4.24	*0.30**
Teachers have received sufficient training on reading and understanding sources of student data.	3.40	4.08	*0.68**
Teachers have received sufficient training on reading and understanding standardized achievement data.	3.48	4.28	*0.80**
Teachers have access to information management systems (Exam View, MAPS, etc.).	4.44	4.86	*0.42**
I have received adequate training to effectively interpret and act upon student assessment results.	3.04	4.36	*1.32**
I understand how to calculate the mean, median, and normative data using MAP results for my class.	2.68	4.92	*2.24**

(*table continues*)

Item	Pretest mean	Posttest mean	Difference
When distributed, data and reports are tailored to meet the needs of the particular audience.	4.78	5.02	*0.24**
I have input into the data elements that are captured in school and district data systems.	4.10	4.46	*0.36**
I have input into the reports that are created by school and district data systems.	4.14	4.62	*0.48**
I can access the information I need from school and district data systems to examine relationships that impact student learning.	3.96	4.82	*0.86**
I understand how using data management technologies can improve student learning outcomes.	5.00	5.22	*0.22**
I know how to use spreadsheets and/or other technology tools to collect and analyze student data for progress monitoring during the year.	2.06	3.72	*1.66**
My professional development has helped me use data more effectively.	2.56	4.16	*1.60**
I have a solid conceptual understanding of data-driven decision-making principles and practices.	4.00	4.72	*0.72**
I find that the data analysis provided by online assessments produce outcome data that are easy to interpret.	3.52	4.10	*0.58**
Teachers have access to a variety of student achievement data.	4.30	4.58	*0.28**

Note. Differences are obtained by subtracting the pretest mean score from the posttest mean score. Differences marked with an asterisk (*) are significant at $\alpha = 5\%$.

Using aggregate scores, perceived abilities to analyze and use student data had improved by 12.76 points (from 59.40 to 72.16). Not surprisingly, this increase was found to be significant, as evidenced by an ANOVA performed on the data. Full results of the ANOVA performed are presented in Table 4. Moreover, the intervention was found to be accountable for about 27.6% of the variation in the differences between the pre- and posttest aggregate scores.

Post diagnostics revealed that the assumption of normality was justified (Kolmogorov-Smirnov's test of normality with two-tailed *p*-value = 0.456). While Levene's test revealed a violation of the equal variances assumption, necessary robust adjustments were applied on the performed ANOVA. Hence, the ANOVA procedure was

appropriate as a means to analyze the data. Thus, the initial hypothesis, which stated, "Teachers' perceived abilities to analyze data improved after participating in a professional development module," was verified to be true and accepted accordingly.

Table 4

ANOVA Table for Assessment of Perception About "How to Analyze and Use Student Data"

	Type III sum of squares	Degrees of freedom	Mean square	*F*-statistic	*p*-value
Between groups	4070.440	1	4070.440	38.778	*<0.001* *
Within groups	10286.720	98	104.967		
Total	14357.160	99			

Note. Adjusted $R^2 = 0.276$. *p*-value marked with an asterisk (*) is significant at $\alpha = 5\%$.

Investigating the Second Research Question

The second research question examined whether professional development in data-driven decision making changed teachers' perceptions about how to modify instruction for students. The corresponding hypothesis stated, "Teachers' perceived abilities to modify instruction for students using data-driven decision making improved after participating in a professional development module." In this section, results of ANOVAs applied on the mean differences of pretest and posttest assessment of teachers' perceptions are discussed. These findings were used as the basis to validate the hypothesis and answer the second research question. Responses to each item were in the form of a 6-point Likert scale with *strongly disagree* coded as 1 and *strongly agree* coded as 6. ANOVA procedures performed here were similar to that of the previous section, albeit on items found in Section III (Questions 17–32) of the survey (see Appendix B).

Again, diagnostic and model validity checks were performed on the latter ANOVA to determine whether the derived results are strongly reliable in general.

Table 5 shows the mean scores for each item in both pre- and posttest responses corresponding to teachers' perception about how to modify instruction for students. Again, it was quite noticeable that the teachers had increased their perception abilities in each of the items after participation in the professional development module, except for the item *I find it difficult to translate the information generated by data analysis into curriculum*. For this item, a drop from 4.32 to 2.36 was observed. Nevertheless, as the item was stated in a negative tone, it is still an improvement going from pre- to posttest response. The minimum increase was found to 0.02 for the item *My efforts to use data-driven educational practices can improve student learning outcomes and close achievement gaps*. The maximum increase was found to be 2.76 for the item *My efforts to make data-driven decisions to improve my classroom instruction are supported by professional development*. To calculate the average increase (improvement) for each item, the scale for the item *I find it difficult to translate the information generated by data analysis into curriculum* was converted to make it consistent with the others concerning "scale-tone." The average increase (improvement) was found to be 1.3125—amounting to an increase from one-and-a-half scale to another. Each of the individual differences was also found to be significant (via a paired *t*-test analysis) at a significance level of 5%, except for the item with the minimum increase.

Table 5

Pretest and Posttest Assessment of Perception About "How to Modify Instruction for Students"

Item	Pretest mean	Posttest mean	Difference
If we consistently analyze data, we can improve instructional practices.	5.48	5.62	*0.14**
Teachers have received sufficient training on using test results to make informed decisions about teaching the curriculum.	2.72	4.34	*1.62**
Teachers have received sufficient training on using test results for goal setting.	2.28	3.72	*1.44**
Assessment results provide me with the information I need to improve student learning outcomes and close achievement gaps.	4.42	4.80	*0.38**
I know how to plan changes in my instruction for students who need more assistance based on viewing the MAP teacher class report.	2.40	3.42	*1.02**
I know how to plan changes in my instruction based on student assessment results.	2.58	4.36	*1.78**
I know how to plan changes in my instruction by using assessment data to identify subgroups of students who are not experiencing academic success.	2.36	4.14	*1.78**
I know how to plan changes in my instruction by using assessment data to identify individual students who are not experiencing academic success.	2.38	4.14	*1.76**
I know how to plan changes in my instruction by using data from student assessments to set instructional targets and goals.	2.46	3.86	*1.40**
My efforts to make data-driven decisions to improve my classroom instruction are supported by professional development.	2.06	4.82	*2.76**
My efforts to use data-driven educational practices can improve student learning outcomes and close achievement gaps.	4.98	5.00	0.02
I find it difficult to translate the information generated by data analysis into curriculum.	4.32	2.86	*-1.46**
I have the necessary skills to analyze and interpret data to improve instructional practices.	3.72	4.34	*0.62**
I know how to plan changes in my instruction by grouping students to differentiate instruction based on MAP scores.	2.54	4.24	*1.70**
I know how to plan changes in my instruction by using the standard deviations of MAP data to level students.	2.52	4.14	*1.62**
I know how to plan changes in my instruction by using the goal performance areas of the MAP data to direct long-range instructional planning.	2.50	4.00	*1.50**

Note. Differences were obtained by subtracting the pretest mean score from the posttest mean score. Differences marked with an asterisk (*) are significant at $\alpha = 5\%$.

An average aggregate score of 73.00 was observed for the pretest responses, while an average aggregate score of 89.00 was observed for the posttest responses. Moreover, similar to how to analyze and use student data results, aggregate pretest scores were found to be more varied than aggregate posttest scores, as evidenced by their respective standard deviations: 14.2182 for pretest results as compared to 12.0540 for posttest results. An increase of 16.00 points was observed between the aggregate scores for the posttest and pretest responses. Again, this increase was found to be significant as evidenced by an ANOVA performed on the data. Full results of the ANOVA performed are presented in Table 5. Moreover, the intervention was found to be accountable for about 38.7% of the variation in the differences between the pretest and posttest aggregate scores.

Post diagnostics revealed that the assumption of normality was justified (Kolmogorov-Smirnov's test of normality with two-tailed p-value = 0.430) and equal variances (Levene's test of normality with two-tailed p-value = 0.229) were not violated. Hence, the ANOVA procedure was appropriate as a means to analyze the data. Thus, the initial hypothesis, which stated, "Teachers' perceived abilities to modify instruction for students using data-driven decision making improved after participating in a professional development module," was verified to be true and accepted accordingly.

Table 6

ANOVA Table for Assessment of Perception About "How to Modify Instruction for Students"

	Type III sum of squares	Degrees of freedom	Mean square	*F*-statistic	*p*-value
Between groups	11025.000	1	11025.000	63.461	*<0.001**
Within groups	17025.360	98	173.728		
Total	28050.360	99			

Note. Adjusted $R^2 = 0.387$. *p*-value marked with an asterisk (*) is significant at $\alpha = 5\%$.

Summary

The main objective of the study was to determine whether participation in a professional development module in data-driven decision-making has a significant impact on the teachers' perceived abilities to disaggregate student data and make data-driven decisions. Thus, statistical techniques developed to compare means were applied to this study. Individual pre- and posttests item-comparisons were performed using a paired *t*-test approach while aggregate pre- and posttests scores for the two constructs, perceptions about *how to analyze and use student data* and *how to modify instruction for students*, were compared using ANOVA. While the purpose of this study was to determine a relationship between professional development module in data-driven decision-making and perceived abilities to disaggregate student data and make data-driven decisions, it should be noted that the intervention was rather a singular workshop entitled "Stepping Stones: The Effective Use of Data to Chart Student Needs and Progress," rather than all such workshops in general.

It was found that in all items, teachers' perceived abilities improved from pre- to posttests. Using aggregate scores, perceived abilities to analyze and use student data had

improved by 12.76 points (from 59.40 to 72.16) and perceived abilities to modify instruction for students had improved by 16.00 points (from 73.00 to 89.00). Both improvements were found to be significant; hence, it appears that participation in a professional development module in data-driven decision-making, particularly the workshop "Stepping Stones: The Effective Use of Data to Chart Student Needs and Progress," may be linked to increases in teachers' perceived abilities to disaggregate student data and make data-driven decisions. The module was found to have a greater effect in increasing abilities to modify instruction for students than in increasing abilities to analyze and use student data as evidenced by the larger adjusted-R^2. However, teachers' knowledge levels are unknown, and their implementation in the classroom has not been verified. In addition, after a day of professional development one can assume a general feeling of success and comradeship among teachers that might not carry on during the school year.

Section 5: Conclusions and Recommendations

The U.S. Department of Education noted that despite successful efforts to collect and manage data, these efforts had little effect on classroom instructional strategies (Abbott, 2009). Teachers struggle to use data to make informed instructional decisions by identifying discrepancies and creating changes in instructional practices to address these discrepancies. More specifically, collected data can be used to differentiate instructional practices to address student deficiencies uncovered in testing. While the demand exists for teachers to use data to affect instructional practices, few teachers know how to effectively use the data at their disposal. The purpose of this quantitative pre-experimental study was to assess changes in the perceived ability of 50 special education teachers assigned to a variety of levels from Grades 3 to 12 to use data-driven decision-making tools while analyzing student data before and after participation in a professional development module. The data collected from the teachers was used to achieve a twofold goal: to describe the current status of teachers' perceived ability to use data to modify instruction and to determine whether participation in a professional development experience exposing them to data-driven decision-making strategies would result in differences in teachers' perceived ability to use data.

The research questions for this quantitative pre-experimental study were focused on the changes that resulted from participating in professional development training in data-driven decision-making, particularly changes in perceptions about how to analyze and use student data and perceptions about how to modify instruction for students. A pretest-posttest design was used to resolve these research questions. Two ANOVAs were

conducted, using perception scores as the dependent variables and participation in the professional development module as the independent variable.

The first set of ANOVAs investigated the teachers' perceptions about how to analyze and use student data. The results indicated that there were significant increases between the pretest and the posttest scores of the respondents for all the individual items. Similarly, when the scores for the individual items were totaled to correspond to the subscale scores, it was found that participation in professional development training on data-driven decision making increased the teachers' perceived abilities about how to analyze and use student data. The same trend was observed in the results for the ANOVAs for the second research question. The individual items all showed statistically significant increases from the pretest to the posttest. The aggregate post test scores were also significantly higher than the aggregate pretest scores, which indicated that participation in the professional development workshop in data-driven decision making increased teachers' perceived abilities related to how to modify instruction for students.

Conclusions

As asserted by Fusarelli (2008) and Miller (2010), teachers' data literacy needs to be improved in order for effective educational reforms to take place. An evaluation of existing literature on the subject suggests that the gap lies with how the use of data on ongoing benchmarks can help teachers connect data from state assessments with more frequent teacher-directed assessments. Based on the findings from this study, which showed that teachers' perceived ability to analyze student data and modify instructional practices increased from pretest to posttest, it appears that the implementation of professional development training would address the problem of teachers' inability to

effectively use data to affect instructional practices. The findings of this study support the assertion that teachers do not lack the ability to effectively use data gathered from testing, but that they merely lack the necessary training to do so. Suggestions about implementation of these training programs will be discussed in further detail in the recommendations section. Similarly, the teachers' pretest and posttest scores indicated better performance for the second construct, or "how to modify classroom instruction," as opposed to the first construct, or "how to analyze and use student data." This may be attributed to the fact that teachers are used to dealing with matters regarding instructional design but are not very adept or skilled at data mining.

Previous studies asserted the positive effects of data-driven practices on instruction, which points to the importance of equipping teachers with data literacy skills (Garcia & Rothman, 2002; Heritage & Chen, 2005; Kerr et al., 2006; Streifer & Schumann, 2005; Supovitz & Klein, 2003). In concurrence with these studies, the findings of this study support the use of data to drive instruction through adjusting classroom practices and setting goals to help students achieve. Based on these findings, it is recommended that professional development training programs focus on helping teachers develop the necessary data literacy skills to effectively use data on standardized test scores to enhance classroom instructional practices. The five data literacy skills identified by Earl and Katz (2002) could serve as the basic framework for training to develop data literacy in teachers. These training programs should be designed with the orientation that the educators' lack of training and knowledge on how to disseminate and evaluate data is a great disadvantage to the effective use of data to affect instructional practices (Nunnaley, 2007). If lack of training and knowledge of how to disseminate and

evaluate data continues to impact successful data disaggregation, one must look at strategies in KM theory to help teachers move past the deficiencies that teachers exhibit as data disaggregators.

Based on the concept of data literacy as explained by Earl and Katz (2002), three data literacy skills were focused on during the treatment program: defining the purpose, analyzing, and interpreting the data. The other two data literacy skills were applied only minimally, in the exercise of determining which data to use and sharing the results with colleagues in the program. These two aspects need to be explored in future studies and will be discussed as such in a later section of this chapter. The results of the study showed that scores significantly increased from the pretest to the posttest, which could also be interpreted to mean that the program improved specific data literacy skills. The results could be used as the basis to design future training programs to develop data literacy skills and, in turn, promote the use of data-driven practices in education. In this study, the treatment program addressed three out of the five literacy skills identified by Earl and Katz (2002) but was not able to emphasize two skills, namely recognizing the soundness of the data and reporting and communicating the results of the data analysis. This predominantly was because during the course of the treatment, teachers were provided with a specific set of data to work with; they were not taught to identify possible data sources based on their purpose. This should be considered when designing future training programs for teachers and will be discussed in further detail in the recommendations section. Similarly, the weak development of the fifth data literacy skill could be because teachers do not share the results of the data analysis with the students and the parents. If the overall goal of data-driven practices is to improve student learning and achievement,

then this should be achieved in a twofold manner, by improving instructional practices based on data analysis results and improving educational performance by identifying specific action points or areas that the student can work on with the help of parents or guardians. To apply the concept of KM within the school, the teachers' knowledge of the trends within the results of standardized tests is disseminated and applied in specific ways to achieve tangible results for the students and for the school.

NCLB has created stress among teachers brought about by the concern that they are evaluated based on their students' test scores (Wiggins & McTighe, 2007). The implementation of such professional development training programs could help teachers cope with the situation because it helps them target the specific areas where students are deficient. The use of data to change instructional policies could have a positive effect on student achievement because teachers' efforts are now geared toward the specific needs of the students. As such, teachers can also identify high-priority standards that have been targeted on recent assessments and focus more time and attention toward those areas. This is a means by which teachers can increase the chances of their students succeeding and reaching beyond the basic proficiencies needed to meet NCLB demands. In connection to this, Earl and Katz (2006) have identified a three-step method to achieve improved student performance. As part of this method, teachers are encouraged to be responsible for identifying weaknesses and providing instructional devices to chart plans for improvement.

In order to successfully implement the use of data-driven decision making in schools, school personnel should work together in acknowledgement of the similar path they are taking toward related goals. As found by Jones and Egley (2006), the perception

of teachers and administrators on effective data disaggregation varied; administrators sought to use data to increase test scores, whereas teachers focused on using data to enhance student learning. Given that they are focused on the same goal, the multiple perspectives of teachers and their varied levels of expertise (Spillane, 2006), in combination with the managerial perspective of the school administrators, could provide an effective foundation for sustaining a data analysis movement. The unified efforts between teachers and administrators promote the success of collecting, organizing, and sharing data because they allow teachers to learn and work together, fostering constructive collaboration.

Teachers showed the highest average score in both the pretest and posttest results in the analyzing data section when they responded to the statement *I understand how using data management technologies can improve student-learning outcom*e. This could be in part because during the workshop, I shared the research I encountered, highlighting how the use of data is critical to the formative assessment of students and what it can do to target growth. The highest increase from pretest to posttest scoring was noted for the following statement: *I understand how to calculate the mean, median, and normative data using MAP results for my class*. When distributed, data and reports are tailored to meet the needs of the particular audience. The reason for such an increase may be that the participants and I spent a great deal of time in the workshop covering the calculation of mean, median, and mode for classroom data arrays. Teachers worked with partners and in small groups to compare their mean results from their class rosters and spreadsheets generated from the online reporting suites. During the workshop, teachers were asked to navigate through the teacher, school, and district-level reporting suites and share with the

full group any frustrations they were experiencing. Teachers were asked to view their student data in several formats: individual students, class reports, grade-level reports, and school wide reports. This clearly helped them to note the differences in the particular audiences. Teachers showed the highest average score in both the pretest and posttest results in the instructional modification section when they responded to the following statements: *If we consistently analyze data, we can improve instructional practices*. *My efforts to use data-driven educational practices can improve student learning outcomes and close achievement gaps. Assessment results provide me with the information the researcher needs to improve student learning outcomes and close achievement gaps.* The reason for such an increase may be that the school in this study requires teachers to report in their lesson plans data results on ongoing student assessments. Not only is the importance of ongoing student assessments stressed to teachers by this requirement, it also encourages teachers to note changes in their students' scores if they continually document. The highest increase from the pretest to the posttest scoring for instructional modifications was noted for the following statement: *My efforts to make data-driven decisions to improve my classroom instruction are supported by professional development*. The reason for this change may be that throughout the in-service it was communicated that having access to professional development is an area of need expressed in the research. Teachers were able to be active participants in the training modules.

Limitations

The findings of this study are limited because the respondents of the study were special education teachers. Therefore, the findings of the study may not necessarily be

generalizable to all teachers. It should be acknowledged that the nature of the work of general education teachers and special education teachers varies in many aspects. Therefore, conclusions and results based on data collected from special education teachers to represent the experience of all teachers, including general education teachers, might not be generalizable to the entire population of teachers. The findings of this study may only be representative of special education teachers, who cater to a smaller group of students. While the input of special education teachers is no less important, the experiences of general education teachers may be different. These differences can affect the responses they have to the instruments and, in turn, affect the results of the data analysis on which the study conclusions are based. The favorable responses of the participants may have also been affected by my position as the school's vice-principal despite the measures implemented to emphasize the voluntary nature of the study and the importance of honesty in responding to the study instruments. Despite assurances that participation in this study does not affect their performance evaluations in any way, some of the participants may have felt compelled to respond favorably to the study instrument to curry favor with me. Lastly, the paucity of data on the reliability and validity of the survey instrument adapted for this study may raise questions on the findings of this study. Based on this assertion, it is recommended that future studies in the same area involve a survey instrument with readily available published reliability and validity data.

Recommendations for Future Research and Practice

For Future Research

The recommendations for future research in this study are focused on contributing to four major areas: teachers' knowledge on data-driven practices, teachers' perceptions

of data-driven practices, teachers' performance with regard to the use of data-driven practices, and gaps in existing literature. Further studies on teachers' knowledge on data-driven practices could focus on several areas. First, it should be noted that the treatment program in this study was only able to address three out of the five data literacy skills identified by Earl and Katz (2002). While the treatment program in this study provided background on how to define the purpose for data analysis, use statistical and measurement concepts to properly analyze data, and interpret the data, the program did not focus on developing the skills of distinguishing the soundness of data and effectively communicating the results of the data analysis. As such, it is recommended that future researchers implement a treatment program that addresses all five data literacy skills. Particularly, future research should concentrate measurement on how these five data literacy skills improved through participation in the training program. Once these training programs are completed and teachers are determined to be data literate, another study can be conducted to assess the attitudes of teachers toward the use of data-driven practices and to determine if increased literacy affects willingness to use data to influence instructional practices. In addition to using professional development to increase data capacity, project studies could create user-friendly manuals and online tutorials for teachers to increase competency and knowledge related to the use of data to make instructional decisions.

Increasing knowledge on data-driven practices should not be limited to teachers. In a previous section of this chapter, it was stated that the deficiencies in development of the fifth data literacy skill of communicating the results of the data analysis might be attributed to the fact that teachers do not share the results of the data analysis with

students and parents. Student achievement is also an issue for the students and their families, and sharing the results of the data analysis may help boost student performance by providing specific focus areas for the students and their parents. In this sense, researchers could also look at how data-driven decision making can be beneficial for students and parents.

Similarly, future studies can focus on how attitudes, knowledge, and implementation can be addressed using additional qualitative and quantitative measures. More research is needed on how to effectively implement data analysis to affect instructional practices. Future researchers can conduct mixed-methods studies to compare the various ways schools implement data-driven practices, in order to find a workable model that can be implemented in other schools to promote data analysis to improve instructional outcomes.

Future researchers can also focus on studying teachers' perceptions or attitudes on data-driven practices. Additional research is needed to study the attitudes of school staff that use data to make instructional decisions. In relation to this, the review of related literature noted that there is a paucity of research on the reasons why most teachers have not received proper training with using data to make appropriate decisions for instructional purposes. This study focused on the effectiveness of using professional development training to increase the ability of teachers to analyze and use student data in relation to modifying instructional practices. However, it does not respond to the gap noted in the literature review. For this reason, it is advised that future researchers focus their efforts on examining the administrative reasons behind the lack of training for teachers on the use of data-driven instructional practices. This can include the perceptions

of teachers and administrators on the provision of training programs to develop teachers' data literacy skills. Similarly, additional research study models can use interviews, focus groups, and observations to assess factors that influence the use of data to target instructional decision making.

Other areas for further exploration also include examining the performance of teachers with regard to the use of data-driven practices. Future researchers can investigate ways by which school districts can efficiently monitor and evaluate the extent to which teachers are using data to guide instructional changes. It is imperative that schools learn how to effectively use data to identify the changes that need to be made to improve the academic performance of students. School districts should be tasked to help teachers meet minimum proficiency levels to use student and district data. Policies and protocols should be implemented to appropriately deal with the teachers who do not meet the set minimum proficiency levels. These measures are the first step towards full implementation of data analysis in all schools.

It is also noted that the results of the study revealed a significant improvement in teachers' confidence level or their perceptions of their ability to use data to modify instructional practices. However, the general feeling of success and optimistic outlook may not be sustained during the school year. The ideas that were drafted at the conclusion of the session may not necessarily be implemented in a classroom setting. It is therefore recommended that a follow-up study be conducted to determine whether the ideas that resulted from participation in the professional development module are actually implemented in the classroom. It is also a means to determine if the data are used effectively to improve classroom instruction, which was one of the goals of this study. It

is also suggested that additional research is needed to measure the capacity to which data driven decision making is linked to student achievement. A qualitative case study could be employed to discover student growth on assessments for teachers who use data from technology systems and those who rely solely on teacher practice.

The last set of recommendations for future studies deals with several areas where the methodology of the study can be improved. First, the results and conclusions are based on data collected from special education teachers and not general education teachers, therefore, the findings of the study may not be generalizable to all teachers. It is also recommended that this study be replicated with a sample comprised solely of general education teachers. It is expected that a study using data collected from general education teachers may yield results that have a higher degree of generalizability. Second, as part of the limitations of the study, it was also discussed that my position as the school vice-principal may have compelled the participants to answer the questions more favorably than they would have if the session and the study had been facilitated by an objective third party. In light of this, it is recommended that this study be replicated in other schools, in order to see whether the findings of this study will be supported by similar results in different locations or contexts. Lastly, given the lack of data on the reliability and validity of the instrument adapted for this study, it is recommended that follow-up studies be conducted using a similar instrument that has published and available reliability and validity data.

For Future Practice

It is recommended that school administrations spearhead the initiative for implementing data driven instructional practices. This can be done by institutionalizing

the use of assessment data at the school's disposal to modify existing instructional practices. Data analysis services can be used to identify trends based on assessment data. In turn, the findings of the data analysis can be used by department or level heads when meeting with individual teachers. Discussions during these meetings can focus on identifying the specific skills and topics that students need to improve on. The end goal of these meetings is to draft action plans to address these areas for improvement. Together, teachers and department or level heads can decide on a target date by which students will be assessed on specific topics to determine whether the new instructional practices are effective. If the goals have not been reached by those target dates, then it is suggested that alternative instructional methods should be tried to achieve objectives. Ultimately, the school also benefits from improved student performance. In relation to this, formative assessments should be utilized as a means to determine student performance and progress in between standardized assessments, similar to the method used by a middle school in Florida to close the gaps on the state achievement test (LaRocque, 2007). Given that to implement this recommendation requires much time and effort from department or level heads and individual teachers, the administration is expected to provide the support needed to implement data driven practices and achieve educational goals.

As stated above, it is recommended that administrators implement professional development training programs for teachers with regard to data driven decision making. The optimal time to do this would be during regular in-service training conducted during the summer break. The focus of these programs should be findings concrete ways to integrate new knowledge about data-driven decision making into daily classroom instruction. It is advised that training in this area should not be limited to one session

during the in-service training. Rather, it is suggested that a program be designed specifically with the goal of helping teachers increase their ability and confidence level with regard to data driven decision making. It is also recommended that the training program include breakaway sessions segregating the teachers according to level or subject area. During the breakaway sessions, the teachers will be given copies of data from the previous year's standardized assessment. Based on this data, they will be tasked to identify specific areas where student performance needs improvement. Based on these identified areas, the final output will include action plans to address these areas of deficiencies. These sessions will be conducted with the aim of increasing the perceived ability of teachers with regard to data driven practices, which can in turn affect their confidence level with using data to improve instructional practices. Given that effective professional development links teachers' learning and knowledge gained with professional changes in instructional practice (Lierberman & Pointer-Mace, 2008), evident changes in classroom practices, as made tangible by improved test scores, are good criteria by which the success of the professional development training programs can be evaluated. It is also recommended that the basis of a successful professional development training program should not just be based on a single instance of change, but on continual improvement involving adjustments adapting to the changing needs of students, as evidenced by data.

The findings of this study are also relevant for institutions offering education degrees or teaching certificate programs, in particular for the courses on classroom assessment and instructional practices. A class or special seminar focusing on the effective use of data from standardized assessments to improve instructional practices can

be offered to all students under the education program. The duration of this class or seminar does not necessarily have to be the same as a regular course in the education program. It can be conducted in four to six sessions as opposed to a semester-long course, but it is recommended that this course be mandatory for all individuals seeking to obtain a teaching license. It is hoped that by establishing this competency at the most basic level of teacher training and education, the quality of teachers and education can be improved. In line with this goal, a summary of this study and the results will be provided to the school district where the study was conducted for the perusal of the administrators so that the recommendations of this study may be implemented. Similarly, copies of the summarized version of the study will be available to teachers in other schools within the district.

Social Change

The use of data driven practices has the greatest impact for teachers and students. Even though administrators at the district and school board level can recommend various policies to encourage the use of data driven practices, the task of actual implementation falls to the teachers. This underscores the importance of properly educating teachers about how data literacy can help them improve their instructional practices to increase student learning. For teachers, it is asserted that the empowerment of the teachers through improving their level of data literacy can help increase the chances of successfully implementing data driven practices. It can also serve to empower classroom teachers to educate themselves on how to continually improve their data literacy so that they can effectively use student and district data to improve their classroom instructional practices. There is also an effect on the transfer of information from special education teachers to

general education teachers, especially in terms of how they can respond to the individual needs of their students. The more information available to teachers, whether special education or general education, the better equipped they are to meet their instructional goals.

Educators are responsible for capitalizing on student strengths, identifying student weaknesses, and finding ways to differentiate the curriculum so that all students have the opportunity to experience success. The effective use of student and district data, particularly those derived from standardized testing, can help the school system achieve this goal. On a grassroots level, the ability to effectively use data can help teachers tailor instructional practices for specific students, resulting in a more productive classroom experience for the teacher and improved academic performance for the students.

Students and their parents also stand to benefit from the use of data driven practices. Making instructional practices more directed towards the specific needs of each group of students can result in a more efficient learning experience for the student. The results of data driven decision-making, especially when properly communicated to the students and their parents, can also result in more productive efforts on the part of the parents to help their children perform academically.

The findings of this study also have implications for administrators, with regard to making improvements in school organizations. The use of data driven practices can help administrators when it comes to making decisions on offering additional learning programs that can benefit the most number of students. For instance, a school that shows consistently low scores in reading and language tests, but adequate performance in math and science, can divert valuable funds towards reading and English programs to improve

student performance in these areas. In this way, the resources of the school are effectively managed towards achieving the objective, which is to teach students.

The findings of this study are of immediate significance to educational policy makers at the district and school board level. However, social change on a larger scale can be achieved through the assertions by previous researchers on the positive effects of data literacy among teachers in order to improve student performance. Study results provide support to the conceptualization and implementation of professional development training programs to improve data literacy among teachers and consequently improve students' educational experience. Similarly, the study results provide the administrators with the first step towards successfully implementing data driven practices.

The study hoped to incite social change through the collaboration of teachers under the guidance of a professional development module. That module aimed to develop teachers' perceived capacity to use data to enhance instructional decision-making processes. This study assessed the local problem by determining teacher perceived capacity and directed the district in looking at ways to provide support to teachers through professional development efforts so that teachers could increase their data literate capacity.

Summary

Schools have access to data, but teachers lack the capacity to effectively use it to make informed decisions to improve instructional practices and student learning. Hence, there is a need to find ways to help increase the level of data literacy in teachers and to help them acquire the skills needed to effectively use the available data to improve student learning. This study sought to determine whether participation in a professional

training program would improve data literacy in a group of special education teachers. The results indicated that after participation in the training program, there was a significant increase between the pretest and posttest scores of the teachers' perceived ability to analyze and use student data and modify instructional practices accordingly. Based on these results, it is concluded that while the generalizability of the results may be affected by the fact that the sample is composed of special education teachers, the implementation of professional development training programs to increase data literacy for teachers is strongly recommended. Teachers will be encouraged to review the results from this study and implement the recommendations identified. Similarly, the findings of this study may be used as a first step for administrators to improve teacher training by incorporating programs or modules on data-driven decision-making to positively affect the classroom experience, and in turn, student academic performance. A copy of my study will be available in a hardbound format for teachers to review results.

Participation in the professional development module had a greater effect on increasing perceived ability to modify instruction rather that perceived ability to analyze and use student data. Based on these results, it was concluded that professional development programs should be implemented to help teachers effectively use data on student testing to improve instructional practices. Suggestions on how to implement these programs included the integration of these modules during in-service training, with breakaway sessions according to level or specialization. Similarly, it is recommended that to respond to the current gap in literature, researchers should focus on determining why most teachers have not received proper training on using data to make appropriate decisions for instructional purposes.

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Appendix A: Permission to Use Instrument

From: Scott McLeod <dr.scott.mcleod@gmail.com>

Date: April 3, 2012 11:17:12 AM EDT

To: Toni Johnson <tonijohnson31@gmail.com>

Subject: Re: Data readiness survey.

Reply-To: dr.scott.mcleod@gmail.com

Here you go... :) Feel free to use as you see fit. Hope it will prove beneficial to your research study. Good luck.

SCOTT

Scott McLeod, J.D., Ph.D. Associate Professor, Educational Leadership, & Founding Director, CASTLE University of Kentucky,

+1 707 722 7853 (7077 CASTLE)

www.dangerouslyirrelevant.org

www.scottmcleod.net/contact

www.twitter.com/mcleod

On Tue, Apr 3, 2012 at 10:12 AM, Toni Johnson <tonijohnson31@gmail.com> wrote:

Dr. McLeod,

A researcher friend of mine suggested reviewing your data readiness survey to gain insight for a study I will be conducting on data-driven decision-making. I am unable to locate it on the web. Would you be willing to share? Would you grant me permission to use in a study in a southern New Jersey middle school?

Thanks

Toni Johnson

Sent from my iPad

4 attachments — Download all attachments

MNPrincipalSurvey.pdf

20K View Download

MNSuperintendentSurvey.pdf

21K View Download

MNTeacherSurvey.pdf

20K View Download

MNTechCoordinatorSurvey.pdf

19K View Download

Appendix B: Data-Driven Decision Making

Adapted from McLeod's DDDM Survey

Demographics Section I

1. How long have you held your position in your school or district?
   _____Less than one year
   _____One to three years
   _____Four to 15 years
   _____More than 15 years

2. Please rate your own technology fluency.
   _____Novice
   _____Nearing Proficient
   _____Proficient
   _____Advanced

The remaining survey questions use the following scale.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

Please circle the response that best fits you and your school for the remainder of the survey questions.

Analyzing and Using Student Data Section II

1. Data management tools simplify the process of analyzing data.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

2. Teachers have received sufficient training on reading and understanding sources of student data.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

3. Teachers have received sufficient training on reading and understanding standardized achievement data.

1	2	3	4	5	6

Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

4. Teachers have access to information management systems (Exam View, MAPS, etc.)

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

5. I have received adequate training to effectively interpret and act upon student assessment results.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

6. I understand how to calculate the mean, median, and normative data using MAP results for my class.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

7. When distributed, data and reports are tailored to meet the needs of the particular audience.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

8. I have input into the data elements that are captured in school and district data systems.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

9. I have input into the reports that are created by school and district data systems.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

10. I can access the information I need from school and district data systems to examine relationships that impact student learning.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

11. I understand how using data management technologies can improve student learning outcomes.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

12. I know how to use spreadsheets and/or other technology tools to collect and analyze student data for progress monitoring during the year.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

13. My professional development has helped me use data more effectively.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

14. I have a solid conceptual understanding of data-driven decision-making principles and practices.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

15. I find that the data analysis provided by online assessments produce outcome data that are easy to interpret.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

16. Teachers have access to a variety of student achievement data.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

Modifications to Instructional Practices Section III

17. If we consistently analyze data, we can improve instructional practices.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

18. Teachers have received sufficient training on using test results to make informed decisions
about teaching the curriculum.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

19. Teachers have received sufficient training on using test results for goal setting.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

20. Assessment results provide me with the information I need to improve student learning outcomes and close achievement gaps.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

21. I know how to plan changes in my instruction for students who need more assistance based on viewing the MAP teacher class report.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

22. I know how to plan changes in my instruction based on student assessment results.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

23. I know how to plan changes in my instruction by using assessment data to identify subgroups of students who are not experiencing academic success.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

24. I know how to plan changes in my instruction by using assessment data to identify individual students who are not experiencing academic success.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

25. I know how to plan changes in my instruction by using data from student assessments to set instructional targets and goals.

1	2	3	4	5	6

Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

26. My efforts to make data-driven decisions to improve my classroom instruction are supported by professional development.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

27. My efforts to use data-driven educational practices can improve student learning outcomes and close achievement gaps.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

28. I find it difficult to translate the information generated by data analysis into curriculum.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

29. I have the necessary skills to analyze and interpret data to improve instructional practices.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

30. I know how to plan changes in my instruction by grouping students to differentiate instruction based on MAP scores.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

31. I know how to plan changes in my instruction by using the standard deviations of MAP data to level students.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

32. I know how to plan changes in my instruction by using the goal performance areas of the
MAP data to direct long range instructional planning.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

Appendix C: Stepping Stones—Professional Development Session

The Effective Use of Data to Chart Student Needs and Progress

Workshop Goals

- Learn how Measures of Academic Progress MAP data relates to the classroom. This class prompts teachers to use data from the MAP assessment to inform their instruction.
- Understand how to access and use the NWEA Reports Site. Teachers will understand how to obtain and use MAP report data.
- Learn to navigate through the Teacher, School, and District-Level Reporting Suites and plan to effectively use and share the information.
- Apply the information from reports to instructional practices and use test results to differentiate instruction, form flexible groups, and develop strategies to meet each student's needs.
- Find out how to set growth targets and understand how to analyze data over time for effective programs and instruction.

Suggested Use of Data

- Determine precisely which concepts a student has mastered, and which areas to focus on for academic growth.
- Compare academic progress with other children in the class, grade or district.
- Track academic growth over a school year or over several years - even if the student changes schools within a district.
- Determine how to fine-tune specific programs from year to year.

In this Professional development training, participants will investigate the essential reports available after the administration of Measure of Academic Progress (MAP). This workshop provides an opportunity to access and interpret reports and is specifically designed for teachers to analyze and learn to interpret data, and engage with other faculty to create an environment responsive to the needs of all students.

Schedule- 8:30-3:00

Materials Needed:
Facilitator- Projector, Screen, and computer with internet access
Participants- One computer per person, printer access, Adobe reader installed.

Reports Needed

- Participants should bring their user name and password for the NWEA Report site.
- Bring printed or electronic copies of the following reports to the workshop
    1. Teacher report- By goal descriptors
    2. Student Progress Report- one student to use as a sample
    3. Student Goal setting Worksheet
    4. Class Breakdown by Goal Report
    5. Achievement Status and Growth Projection reports

Workshop Outline

- Introductions and Prior Knowledge
    1. Participants comment on the MAP experience and ask questions
    2. Participants recall MAP terms

- Analyzing the Teacher/Class report
    1. Participants access and interpret the Teacher/Class Report

- Class Breakdown report: A continuum of Learning Through the Use of Instructional Data
    1. Participants understand how the class breakdowns by RIT and Goal Reports are designed as instructional resources

- Achievement Status and Growth
    1. Participants understand how to interpret and apply data from the ASG Projection and Summary Reports

- Sharing Data : Student Progress Report and Student Goal Setting
    1. Participants define goal performance areas and understand how to discuss scores and skills.
    2. Participants access and interpret data from the individual Student Progress Report in order to share MAP data.

- Closing, Planning Forward
    1. Participants develop a plan to continually apply their new learning about MAP data within their communities.

Skill Analysis Exercise- To be completed during PD session.

List three skill sets, as defined through the MAP Assessment Reports, that students from your **school** have experienced success in this school year (ex. Main idea, fractions, extending ideas, etc.).

1.

2.
3.

Using your own class roster, list the top three areas of success that your students experienced this year.

1.
2.
3.

List three skill sets, as defined through the MAP Assessment Reports, that students from your **school** have NOT experienced success in this school year (ex. Main idea, fractions, extending ideas, etc.).

1.
2.
3.

Using your own class roster, list the top three areas that your students did NOT experience success with this year.

1.
2.
3.

Using your own class roster, list the three areas of student achievement in which you are the most disappointed.

1.

2.
3.

Discuss with a partner or members of your small group, three strategies that you have used when teaching the skills listed in question #2.

1.
2.
3.

Discuss with a partner or members of your small group, three strategies that may improve instruction of skills listed in question #4.

1.
2.
3.

Curriculum Vitae

TONI LEHMAN

EDUCATION

Doctor of Philosophy—Educational Leadership 2015
Walden University, Minneapolis, MN

Master of Arts—Educational Administration 2004
Rowan University, Glassboro, NJ

Bachelor of Arts 1998
University of Scranton, Scranton, PA

CERTIFICATIONS

New Jersey Principal/Supervisor 2004
New Jersey Middle School Literacy Teacher 2004
New Jersey Elementary School Teacher 1998

ADMINISTRATIVE WORK EXPERIENCE

Middle School Principal 2013–Present
Middle Township Middle School, Cape May, NJ

Middle School Vice Principal 2012–2013
Middle Township Middle School, Cape May, NJ

Literacy Supervisor 2006–2012
Middle Township Middle School, Cape May, NJ
I instructed a newly established initiative for at-risk students, provided assistance and support to literacy teachers, and coordinated professional development and held bi-monthly meetings. I targeted appropriated funds for literacy program enhancements/materials, supplies, technology, and professional development. I also viewed and analyzed data from Learnia and MAPS, online state-funded data-driven assessment tools. I also served as a Balanced Literacy Pilot team leader. As Literacy Department newsletter coordinator, I maintained parent connections, and tested and scored a summer entrance exam for prospective Gifted and Talented students.

Assistant Athletic Director 2010–2012
Middle Township Middle School, Cape May, NJ
I coordinated game and practice schedules. I also facilitated communication among coaches, players, assignors, umpires, and the transportation department. I evaluated coaches at the conclusion of a season with the use of a formal observation tool, ordered pertinent supplies and equipment, monitored the status of student academic eligibility and health clearances,

and sponsored a student trip to the Men's Atlantic 10 college basketball tournament.

Administrative Intern 2003–2004
Middle Township Middle School, Cape May, NJ
As administrative intern, I participated in the development/revision of a basic math and reading curriculum along with individual student scheduling. I worked with the Guidance Department in administering GEPA testing. I informally observed teachers and wrote evaluations, interviewed candidates for vice principal position, spent positive reinforcement time with students, and worked with principal on staff advisory concerns. I educated staff and students through anti-bullying school-wide assemblies, helped prepare district-wide bullying/harassment policy, and created and revised student handbook. I participated as teacher liaison on the Home School Association Committee, analyzed Math GEPA scores through data analysis, and participated on the Math Task Force Committee. I served as a member of the Scheduling Committee, and set up and supervised the peer mentoring program.

ACADEMIC WORK EXPERIENCE

Homebound Instructor 2002-2011
Middle Township Middle School, Cape May, NJ

Summer School English Teacher 2002–2011
Middle Township Middle School, Cape May, NJ

Literacy Teacher 2003–2011
Middle Township Middle School, Cape May, NJ
Teacher of varied ability levels, sixth-grade Gifted and Talented. Co-organized, administered, and scored an entry test used for gifted placement. Co-created a matrix for determining placement in the Gifted Program.

Math Teacher 2001–2003
Middle Township Middle School, Cape May, NJ
As a seventh and eighth grade math teacher, I provided Math instruction based on core curriculum standards and GEPA preparation. I researched and piloted the Connected Math series.

Second Grade Teacher 1999–2000
Peterstown School #3, Elizabeth, NJ

Second Grade Teacher 2000–2001
Washington Ave. School, Pleasantville, NJ

Kindergarten Teacher 1998–1999
Bender Memorial Academy, Elizabeth, NJ

DISTRICT AND SCHOOL DEVELOPMENT EXPERIENCE

Literacy Curriculum Committee 2004–2011
Rewrote the curriculum for sixth, seventh, and eighth grades in the area of Language

Arts/Literacy. I created tests for online data-driven assessment testing. Attended workshops designed to align the curriculum from kindergarten through high school.

Connected Math Implementation Committee 2003–2004
Attended workshops and conferences regarding components of the new math. Participated in site visits to other schools in the area currently using "new" Math programs. Attended Math task force meetings to discuss Math issues with other educators.

Facilitator for Peer Mentoring Project 2003–2004
Trained eighth grade peer mentors/tutors to work with at-risk students. Scheduled meeting times and assisted during mentoring sessions.

School District Anti-Bullying Committee 2003–2004
Coordinated Anti-Bullying assemblies outlining school policy. Presented information to staff at faculty meeting.

CO-CURRICULAR EXPERIENCE

Girls' Soccer Coach 2002
Middle Township Middle School Girls Soccer
Coordinated practices, intensive training, and skills programs.

Girls' Soccer Coach 1998
Rahway High School Girls Soccer
Coordinated practices, intensive training, and skills programs.

Summer Enrichment Language Arts Teacher 2000
Gifted School #21, Elizabeth, NJ
Strengthened aesthetic awareness through the arts using multiple intelligences.

After-School Teams Work Teacher 1999–2000
Peterstown # 3, Elizabeth, NJ
Built students self-concept through various cooperative projects.

Youth Ministry Coordinator 1998–2000
Our Lady of Peace Parish, New Providence, NJ
Planned and supervised group activities for high school teens, managed the youth budget, made contacts and gained support of local organizations, and developed programs that dealt with spirituality, community, and recreation.

Multi-Graded Student Teacher 1997
University of Scranton Campus School, Scranton, PA 1997
Instructed through alternative approach to education in a Montessori School.

Assistant Manager, Lifeguard, and Swim Instructor 1994–1999
Springwood Swim Club, Colonia, NJ
Supervised guard and pool area, coordinated and implemented swim instruction for kids ages 3-14, regulated chlorine and sanitary codes.

EDUCATIONAL PRESENTATIONS

3rd Annual NJNCAG Sharing of Promising District Initiatives for Closing the Achievement Gaps. 2011
Strategic Previewing; Acceleration- A Program using RTI to Address the Needs of At-Risk Students.

AWARDS

Teacher of the Year, Middle Township Middle School, NJ 2010
University of Scranton Jesuit Community Award for Volunteer Service 1998
University of Scranton Volunteer of the Year Award 1994