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Data Driven Decision Making in Schools: The Influence of Professional Development on Educator Perceptions

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DATA DRIVEN DECISION MAKING IN SCHOOLS: THE INFLUENCE OF PROFESSIONAL DEVELOPMENT ON EDUCATOR PERCEPTIONS

By

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Dedication

This dissertation is dedicated to my mother, Christine McLeod, and my father, Lawrence McLeod Jr., for a lifetime of love and encouragement. Their unwavering faith in me has meant more than I can express in words.

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Abstract

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This study examined the influence of in-service training on educator perceptions concerning the use of Data-Driven Decision Making (DDDM) in schools to guide instructional practice. Participants included 63 educators teaching in a southeastern metropolitan city school district. As part of the investigation, participants attended a 90-minute professional development training that focused on integrating DDDM into instructional practice. A pre-assessment and post-assessment questionnaire was completed by each participant to investigate the effects of the training on each participant's perception of DDDM. Using paired samples t-tests, the investigation demonstrated a significant difference in perceptions for three of nine questionnaire item pairs (pre and post pairs). Results supported that the training had a meaningful impact on educator perceptions related to some aspects of DDDM. Furthermore, a Training Effectiveness Scale indicated that overall, participants endorsed the training as useful and effective. The current study ends with a discussion on limitations for this study, practical implications, and suggestions for future research.

Table of Contents

Chapter		Page
1	Introduction	1
2	Literature Review	5
	Overview of Assessment in Schools	5
	Standardized norm-referenced tests	5
	Criterion-referenced tests	6
	Curriculum-based measurements	6
	Understanding Summative versus Formative Assessment	8
	Formative Assessment	10
	Progress Monitoring with Curriculum Based Measurements	12
	Curriculum based measurement revisited	12
	Data Driven Decision Making	16
	Educational Mandates	17
	Professional Development	20
	Educators' Perceptions	22
	Statement of Problem	23
	Purpose of Study	24
	Research Questions	24
	Hypotheses	25
3	Methodology	26
	Participants	26
	Setting	28

The Investigator 28

Pre and Post-Assessment 29

Confidentiality 31

Dependent Variable 31

Procedures 32

Training condition 32

Experimental Design 34

Social Validity 34

4 Results 36

What are Educators' Initial Perceptions of DDDM? 36

In What Ways Did the In-Service Training Influence Educators' Perceptions of DDDM? 39

Social Validity/Training Effectiveness 41

5 Discussion 43

What are Educators' Initial Perceptions of DDDM? 43

In What Ways Did the In-Service Training Influence Educators' Perceptions of DDDM? 45

Social Validity 47

Limitations 48

Future Research 49

Implications for Practice 50

Conclusion 51

References 52

Appendix 1: Pre-Questionnaire 61

Appendix 2: Post-Questionnaire 63

Appendix 3: Consent for Participation 65

Appendix 4: In-Service Presentation Outline 66

CHAPTER 1: Introduction

Today, schools must be ready for the challenge of developing assessment practices that are both meaningful and functional as measures of true performance over time (McGlinchey & Hixson, 2004). “A good assessment should not only do this, but it should also answer important questions about instruction. Namely, is it working? Does it need to be adjusted? Did the adjustment work” (McGlinchey & Hixson, 2004, p. 193)? Therefore, assessments must be sensitive to the effects of instruction and of practical use to teachers in order to advance student achievement (McGlinchey & Hixson, 2004). Because schools struggle to identify a balance between finding a true measure of student progress that is also meaningful to the daily roles and functions of teachers, many may not be using formative data to its full potential.

When asked in 1955 about their preparation in educational assessment, teachers reported their training was insufficient (Noll, 1955), and today, more than 50 years later, research literature shows that teachers continue to feel unprepared to use assessment to guide their instructional practices (Means, Padilla, & Gallager, 2010; Young & Kim, 2010). It stands to reason that the limited amount of training received places teachers at a disadvantage with respect to their ability to effectively implement data-driven instruction in the classroom. As a result of minimal training, teachers also struggle to adhere to federal education mandates for testing, such as those required by the No Child Left Behind Act (NCLB, 2001), which calls for the routine collection and recording of student data.

It appears as though the attention to data in education has gone astray. A recent review of assessment literature conducted by Young and Kim (2010), concluded current educational reform policies like NCLB (2001) may force educators to take for granted the central focus of using data, which is for the purpose of improving instruction (Young & Kim, 2010). That is, by placing importance on reporting data as a method of checking for compliance with NCLB, the emphasis is taken away from teachers working collaboratively on using data to advance instructional practice (Marshall, 2009). In a successful model of data-driven instruction, much more than data collection and reporting is required. Data-driven instruction also means a knowledge of data analysis, interpretation, and decision making to guide instruction; practices that are often considered to be unfamiliar to teachers (Young & Kim, 2010). Therefore, although the pressure to implement data-driven instruction in schools remains high, educators find themselves unequipped to meet the challenge because they have not been adequately trained.

Marsh, Pane, and Hamilton (2006) define data-driven decision making (DDDM) in education as the practice of teachers and administrators systematically collecting and analyzing a variety of data to guide instructional decisions and advance the performance of students and schools. Although data-driven instruction or DDDM was put into practice as a standard for improving student achievement (Massell, 2001), it is important to underscore that what is done with the data (e.g., how it is interpreted, analyzed and used for modifications to instruction) is what matters most when it comes to bringing about results in student achievement (Young & Kim, 2010).

When evaluation gained popularity in the mid 1960s, educators were optimistic of promising outcomes (Herman, 1995).

> "It would provide, we thought, a powerful methodology for solving a variety of problems. We would define our goals; we would assess needs relative to those goals, we would plan programs…assess their progress and outcomes, and learn from experience (and our data) about how to plan and implement better next time, discarding…ideas which didn't work and refining those which did." (Herman, 1985, p. 1)

Today, a significant barrier to DDDM has emerged. It is the limited experience and expertise among school staff members in the area of data analysis (Means, Padilla, DeBarger, & Bakia, 2009) that poses perhaps the greatest challenge. In overcoming this obstacle, professional development has been recognized in assessment literature as a necessary prerequisite for DDDM to be successful (Means et al., 2009). Training for teachers has been found to facilitate educators' understanding and knowledge of data-driven procedures in schools (Means et al., 2009; Young & Kim, 2010).

In addition, the extent to which data effectively advance instructional practice in the classroom has been linked to teachers' assessment practices, pedagogical views, and the relevancy, usefulness, and accessibility of data (Young & Kim, 2010). Therefore, data use in schools must relate to the function or work of a teacher in order for it to be practical (Young & Kim, 2010). Teachers' perceptions about teaching have been found to influence all aspects of instructional practice (Young & Kim, 2010), and their beliefs have been reported as the filter through which new techniques are interpreted and executed (Borko, Mayfield, Marion, Flexer, & Cumbo, 1997).

According to research conducted by Borko et al. (1997) and a more recent review of assessment literature by Young & Kim (2010), the role of teachers' beliefs has been recognized as instrumental in shaping instructional routine. Borko et al (1997) asserted that explicit attention should be put into acknowledging both teachers' beliefs and their assessment practices when planning trainings; pointing out the influence of teachers' beliefs on their teaching practices.

In general the research literature in education supports the need for teacher training in assessment and measurement as well as specifically on the process and procedures used in DDDM (Means et al., 2009; Young & Kim, 2010). Furthermore, researchers suggest that for professional development to be more effective, trainings should acknowledge teachers' perceptions on the topic (Borko et al., 1997; Young & Kim, 2010). With this in mind, the focus of the current study was twofold. First, the aim was to provide teachers with an educational training on how to effectively incorporate DDDM into their instructional practices. Second, the investigation set out to measure educators' perceptions of DDDM and whether a change in views was observed following an in-service training provided to teachers. If the training was found to improve educators' beliefs about DDDM, thereby tapping into pedagogy, then data driven methods of instruction may better generalize into the classroom as a result.

CHAPTER 2: Literature Review

Overview of Assessment in Schools

There are several types of assessments used to evaluate children in schools. By definition assessment is a method used to gain an understanding of the child in order to make informed decisions (Sattler, 2001). According the Sattler (2001), the purposes of assessment often include: screening, problem solving, diagnosis, and progress evaluation. Some popular methods commonly used for these purposes consist of standardized or norm-referenced assessments, criterion referenced tests (informal assessment measures), and curriculum-based assessments (p. 6).

Standardized norm-referenced tests. Standardized norm-referenced tests are used to evaluate a student's performance in relation to the performance of other students on the same test (Sattler, 2001) and are, for example, used as part of a multifactored evaluation to determine identification of a disability. They are standardized on a defined group (the norm group), and scaled so that each score reflects a rank within the norm group (Sattler, 2001). Norm-referenced assessments have been designed to estimate, for instance, intelligence, academic achievement (e.g., reading, mathematics, and writing) fine and gross motor skills, social and emotional functioning, and adaptive behavior (Sattler, 2001). Standardized assessments provide a degree of quantification (e.g., assigning numbers to responses; Cooper, Heron, & Heward, 2010) which serves many beneficial uses, such as to describe the child's present functioning in reference to his or her peer group and identify the nature of specific strengths and weaknesses in an area of functioning (Sattler, 2001). Some opponents of standardized tests believe that certain types (e.g., intelligence tests and achievement tests) are culturally biased and therefore pose a disadvantage to children of minority racial and ethnic groups (Sattler, 2001). Others believe labeling children may not be in the best interest of children (Sattler, 2001).

Criterion-referenced tests. Criterion-referenced tests are intended to determine whether children have reached some pre-established level or standard of performance, typically in an academic subject or skill area (Sattler, 2001). Unlike standardized tests, criterion-references tests measure how well students know an identified set of educational goals included in the school or district curriculum, not how they rank compared to peers of the same age (Anastasi, 1988; Bond, 1996). For example a teacher-made criterion-referenced assessment provides information regarding a child's proficiency in mastering the classroom curriculum. These assessments are considered by many to be informal measures that are used to supplement standardized norm-referenced tests and other assessment procedures (Sattler, 2001). They are seen as particularly advantageous when developing interventions because they can measure performance based on a pre-determined goal (e.g., two or less office disciplinary referrals per academic semester) (Sattler, 2001). A disadvantage of criterion-referenced tests is that they are not normed on a specific group, such as a child's same-aged peers, rather performance is measured based on whether gains in an academic or skill area are made relative to the set criterion.

Curriculum-based measurements. Curriculum-Based Measurements (CBMs) in education are a set of specific measurement methods (Hintze, Christ, & Methe, 2006) for assessing student progress over time and for identifying students in need of additional instructional support or further diagnostic testing (Howell & Nolet, 2000). As defined by Tucker (1987), CBM meets three specific requirements of curriculum-based assessment (which is a broader term that refers to information collected for purpose of decision making). First, measurement materials are aligned with the school's curriculum. Second, measurement is frequent. Third, assessment information is used to formulate instructional decisions (Tucker, 1987).

According to Sattler (2001), curriculum based measurement is used to measure student's level of mastery, by comparing a student's performance to a criteria set in the curriculum. Standardized samples of student performance on curriculum-based materials are obtained (Sattler, 2001)**.** For example a series of assessments can be developed to determine mastery of four levels of reading performance based on grade. The levels of reading performance might be constructed as follows (Sattler 2001): (a) ability to read beginning level basal readers (at grades one and two); (b) ability to read all levels of basal readers (grades two through five or materials at the elementary level); (c) ability to read most newspapers (curriculum materials found in high school); (d) ability to read college level material (Sattler, 2001). Examples of questions one might find as part of a curriculum based assessment include the following (Sattler, 2001): (a) How many words were read correctly by a student in one minute? (b) How many words were written by a student in three minutes?

Web-based applications of CBM, such as the Dynamic Indicators of Basic Early Literacy Skills (DIBELS), allow for the development of school-wide models of reading intervention for all students (Simmons et al., 2002). The DIBELS curriculum based assessments measure the five big ideas in early literacy (or reading development). These include phonemic awareness, phonics, vocabulary, fluency, and comprehension (Official DIBELS Homepage, n.d.). CBM will be described in further detail below as it relates to the current study.

Understanding Summative versus Formative Assessment

Black and Wiliam (1998) define assessment in broad terms to encompass all activities that teachers and students carry out in an effort to gain information that can be used diagnostically to adapt teaching and learning (Boston, 2002). So along with there being various specific types of tests (described above), educational assessment can also be categorized, more generally, as summative or formative in nature. The scores that result from measurement are data (Cooper et al., 2007). Data are information that is organized for analysis and used to reason and make decisions (Cooper, et al., 2007). The difference lies in the data that are either a fixed estimate (summative) or an ongoing measure of performance (e.g., formative assessment that can be used to monitor fluid progress overtime).

Consider for instance, a fifth grade student asked why he or she is learning about grammar in school. Their response might have something to do with a goal of passing a test to move on to sixth grade. The test at the end of a lesson that determines a passing or failing grade is a summative assessment (Kaftan, Buck, & Haack, 2006). Summative data represent static information that provides an image of a student’s academic performance at a specific period in time; typically after instruction has taken place (Garrison & Ehringhaus, 2007).

Garrison and Ehringhaus (2007) state summative assessments should be considered the means to estimate learning relative to curriculum standards at one specific culminating moment. In other words, summative assessments are administered every so often to establish what it is that students know and do not know at a point (Black, Harrison, Hodgen, Marshall, & Serret, 2010; Black & Wiliam, 1998, 2010). The information supplied is a measure of cumulative knowledge, often at a pre-established ending point in content.

State assessments (e.g., given annually) are an example of standardized tests that are summative (Garrison & Ehringhaus, 2007). End of the year state tests evaluate the influence of grade level curriculum on student achievement gains throughout an academic school year. Garrison and Ehringhaus (2007) explain summative data at the district and classroom level are a measure of accountability for the school. Changes to curriculum can be based on summative information; however, this is usually done at an ending point (e.g., state assessment in the spring determine changes in curriculum for the following school year), thereby making adjustments to current instruction improbable. Additional examples of summative assessments include the following (Garrison & Ehringhaus, 2007):

- End of unit or chapter tests
- End of semester exams
- Annual yearly performance (AYP) tests
- Students report card grades

The latter two examples are scores commonly used for accountability of schools.

Black and William (1998, 2010) and Black et al. (2010) propose frequent brief tests are much better for the purpose of making instructional modifications to meet the individual performance needs of students than infrequent lengthy assessments. In today's schools, the tendency to use summative assessments to meet state mandated accountability measures "…points out the disparate understanding of assessment for learning (or knowledge), which is the purpose of schooling." (Kaftan et al., 2006, p. 44)

Garrison & Ehringhaus (2007), Black and Wiliam, (1998, 2010) and Black et al. argue summative assessments are administered too far along the "learning path" (Garrison & Ehringhaus, 2007, p. 1) to give informative data to the classroom or to make instructional adjustments based on the information provided. On the contrary, because formative assessments are integrated as part of routine classroom practice, the resulting data offer the information needed to modify teaching and learning as it is occurring; bringing the focus back to learning to build students' knowledge (Black, Harrison, Lee, Marshall, William, 2003; Garrison & Ehringhaus, 2007).

Formative Assessment

It is said that assessments become formative when the data are used to modify teaching and learning to meet students' academic needs (Boston, 2002). Formative assessments are identified as being a part of the instructional process (Garrison & Ehringhaus, 2007). They are evaluations that are intended to provide feedback on student progress and to advance learning (Cizek, Fitzgerald, & Rachor, 1995). The data from formative measures closely approximate students' academic skill acquisition and knowledge (Cizek et al., 1995; Herman & Door-Bremme, 1983; Mullin & Hill, 1997). CBMs are one example of formative assessment.

Formative measures can be applied in a meaningful way to help educators define learning goals for students as they plan instruction (Brady & McColl, 2010). Formative evaluation practices in a classroom setting serve several functions. They assist in planning lessons, grouping students for instruction, targeting individual student strengths and weaknesses, and adapting instruction to meet students' academic performance needs as the school year progresses (Herman & Door-Bremme, 1983; Stiggins & Bridgeforde, 1985).

In an early review of literature, Black and Wiliam (1998) compiled over 200 sources (spanning from 1988 – 1998) on the effectiveness of what was gradually being called formative evaluation in schools (Sadler, 1998). Even in its infancy, the purpose of this approach was to provide feedback on student progress to accelerate the learning process (Sadler, 1998). This extensive research was conducted to better understand formative assessment and determine whether formative evaluation actually increased academic performance, in effect raising classroom standards (Black & Wiliam, 1998). Findings highlighted the value of using formative evaluation, establishing that in general, formative assessment is effective in practically all educational areas including: content areas, knowledge and skill types, and levels of education (Sadler, 1998).

Given the positive effects on academic performance that have been supported with the application of formative assessment in schools, a sizeable literature base is available to suggest it should be incorporated as part of the instructional process at the classroom level **(**Bell & Cowie, 2001; Black & Wiliam, 1998; Boston & Carol, 2002; Garrison & Ehringhaus, 2007; Kaftan et al., 2006; Sadler, 1998). Research has also shown that when using data in a formative manner, timely results from the assessments can be applied by teachers and schools to guide instructional decisions throughout the school year (Young & Kim, 2010). Young & Kim (2008) determined formative uses of data in education contributed to publications from 1980 - 2008, moving data-driven or data-informed decision-making to the forefront of scholarly articles.

A distinction is made between collecting formative data and taking it a step further to using evaluation to guide instructional improvement. Garrison and Ehringhaus (2007) make it clear that in prescribing to a practice of using sound instruction to gain information on student learning, teachers are applying the data gathered in a formative (to inform instruction) manner. Therefore, formative evaluation is a pedagogy that is not discernable from instruction (Garrison & Ehringhaus, 2007). In other words, teaching and DDDM become melded into one during instructional practice. The distinction is in whether or not educators use the information (e.g., data) gathered on student learning to adapt instruction (Garrison & Ehringhaus, 2007); with data collection being just an initial step.

Progress Monitoring with Curriculum Based Measurements

One way to use formative assessment data to further student learning is to integrate it into a progress monitoring system in the classroom. Progress monitoring as a formative evaluation shows sensitivity to instructional modifications and intervention effects (Simmons et al., 2002). It is a method of keeping track of students' performance over time (Howell & Nolet, 1999) with routine data collection by means of student assessment. When implemented in a formative manner (e.g., regularly to inform instruction) progress monitoring leads to academic skill development and it is designed to estimate rate of improvement, target levels of student performance (e.g., meeting adequate progress; not demonstrating adequate academic growth), as well as allow the educator to adapt instruction accordingly (Capizzi & Fuchs, 2005).

Curriculum based measurement revisited. CBMs are the most frequently used and well-researched method of monitoring progress (Capizzi & Fuchs, 2005; Clarke &

McCallum 2001; Simmons et al., 2002). In contrast to most summative assessments, advantages of CBM include: (a) frequent, but quick administration, (b) use of local norms for comparison, and (c) immediate feedback (scores) that allow for adaptations to instruction throughout the academic year (Tucker, 1987*)*. CBM is given routinely to supplement and guide instruction. Administration and scoring are brief; taking only a matter of minutes to complete (Capizzi & Fuchs, 2005). The results are compared to a local sample of students, often times at the district, school, or classroom level. That is, one student's score can be compared to that of his or her peers, rather than to that of the national average (which may or may not be representative of the students in the classroom; Capizzi & Fuchs, 2005).

CBM probes (or short tests) are administered to students throughout the school year to monitor academic progress. The probes are given the same way each time they are administered. They are quick assessments of the same skill; however, the level of skill assessed varies (typically becoming somewhat more advanced) with each probe to illustrate rate of academic growth. To assess reading for example, probes are scored for accuracy and speed to determine skill proficiency (Capizzi & Fuchs, 2005). Reading probes assess the five key components of a reading program identified by the National Reading Panel (2000) as phonemic awareness, phonics, vocabulary, fluency, and comprehension. Therefore, CBM in reading would consist of brief assessments that test reading skills that students are expected to build proficiency in by the end of an academic grade level (e.g., first grade probes in phonics, vocabulary, and fluency skills; Clarke, 2009). In this manner, "CBM provides educators with an overall indicator of student competence and progress in the (year-long) curriculum" (Clarke, 2009, p. 31). CBM is also available for progress monitoring in other subject areas such as in math, writing, and spelling in addition to reading (National Center on Student Progress Monitoring, n.d.).

There are several advantages to CBM (Deno & Fuchs, 1987; Deno, Fuchs, Marston, & Shin, 2001). It improves the connection between testing and teaching by enabling an understanding of the extent to which a student is performing in the curriculum. CBM also improves instruction by helping to determine the effectiveness of both instruction and interventions. CBM facilitates communication between general and special educators and between school and home (Deno & Fuchs, 1987; Deno et al., 2001). It enables schools and districts to build local norms that can then direct teachers in interpreting data (National Center on Student Progress Monitoring, n.d.). It has the ability to provide documentation of student progress for accountability purposes (e.g., adequate yearly progress; National Center on Student Progress Monitoring, n.d.; Clarke, 2009). In addition, a representative sample of local norms can be used for comparison of one student's score to that of classroom, school, or even district level peers (Capizzi & Fuchs, 2005; National Center on Student Progress Monitoring, n.d.).

By and large, research has shown the use of CBM in education as it provides an attainable and technically strong technique for measuring student progress (Stecker, Fuchs, & Fuchs 2005). Even with the tremendous impact of NCLB on general education, the use of CBM in general education has been recognized as quite limited. This continues to be the case despite empirical support demonstrating that CBM is a valid and reliable indicator of progress monitoring in special education (Boon, Fore, Lawson, & Martin, 2007; Shinn, Shinn, Hamilton, & Clarke, 2002).

Stecker et al. (2005) review of research concluded that teachers' use of CBM for student progress monitoring yields gains in student achievement. The key areas which should be addressed to best assist teachers with proper implementation of CBM encompass the following (Stecker et al., 2005): (a) training on CBM, (b) utilization of a data-decision framework, (c) understanding of computer software to make efficient use of data, and (d) ongoing support to devise and implement instructional changes for students (b) introduction of educational resources (in CBM). Furthermore, according to Deno (1985), Deno et al. (2001), and Capizzi and Fuchs (2005), utilizing CBM with feedback for students can assist teachers in modifying instruction for below average achieving students.

The professional development session presented as part of the current investigation was developed to support the recommendations set forth by Stecker et al. (2005) and the extant literature on using CBM and data-driven methods of progress monitoring. The goal was to create a training session for educators to illustrate how to use CBM at the classroom level to improve student achievement. It was based on principles of efficient data-driven instruction that comprised a systematic approach to (a) collecting data (with the use of CBM), (b) graphing data (to illustrate student performance overtime), (c) analyzing trends in the data (to guide instruction), and (d) making appropriate instructional adjustments (to improve academic progress).

Given that the professional development training used in this study was grounded in DDDM as examined in the research to be effective in schools, the topic of DDDM in the classroom is addressed in greater detail in the sections below. Professional development as a strategy to assist educators in producing data-driven instructional improvements will also be discussed.

Data Driven Decision Making

On the subject of data driven instruction, assessment is recognized in the literature as a topic that can seem daunting to educators. Garrison and Ehringhaus (2007) convey an understanding of how overwhelming testing can be, simply because it is an enormous topic "…that encompasses everything from statewide accountability tests to district benchmark or interim tests to everyday classroom tests" (p. 1). Therefore, in order to ease the burden of what seems to be an excessive use of tests, researchers have suggested educators frame their point of view about testing as measurement that is used to gather information (Garrison & Ehringhaus, 2007). The more information (or data) educators have, the greater their understanding of achievement becomes and they begin to learn where gaps in student performance are present (Garrison & Ehringhaus, 2007).

It is true that a considerable amount of national research is available to support the use of data driven instruction to improve achievement (National Center for Educational Accountability, 2002), albeit there appears to be some confusion regarding how a data-driven method of instruction should be conceptualized and then carried out effectively at the school level. Marsh et al. (2006) provide clarification with a school-focused definition of DDDM. DDDM in education refers to teachers and administrators systematically collecting and analyzing a variety of data to guide educational decisions and improve the performance of students and schools.

Of interest to most principals today is determining how to improve teaching and learning (Clarke, 2009). In so doing, a well-researched method of tiered instruction called response to intervention (RTI) has come to the forefront of assessment literature (Fuchs & Fuchs, 2007). RTI incorporates DDDM at every level, or tier, of teaching (Clarke, 2009) and therefore applies with regard to this study. Administrators want to know how to implement RTI effectively to help struggling learners and one critical component to successful implementation, is an understanding of student progress monitoring (with CBM and DDDM) (Clarke, 2009). Almost 30 years of empirical research points to a data-driven method of progress monitoring as the most reliable indicator of student progress in basic academic skill areas (Fuchs et al., 2006; Clarke, 2009).

According to Mellard and Johnson (2008), utilizing a data-driven method of monitoring student performance will supply educators with the data to make instructional modifications based on the following: whether a student is making sufficient progress in the general curriculum, is in need of a more intensive and individualized type of instruction, or has responded adequately to an academic intervention or instructional modification (and can return to general instruction) (Mellard and Johnson, 2008). Each level of DDDM with CBM allows for informed instruction, with attention being paid to a student's individual needs and measures of small student gains toward long-term academic goals (Deno et al., 2001; Mellard & Johnson, 2008; Stecker, Fuchs, & Fuchs, 2005).

Educational Mandates

According to the Department of Education, "The use of student data to improve education and help students succeed is a national priority" (Means et al., 2010). For many years, research on school improvement and school effectiveness has shown data use to be essential to the advancement of instruction (Chrispeels, 1992; Coburn &

Talbert, 2006; Young & Kim, 2010). Studies on student achievement have documented a relationship between the active use of data and increased academic performance (Datnow, Park, & Wohlstetter, 2007; Snipes, Doolittle, & Herlihy, 2002). Furthermore, as districts and schools have searched for strategies to better achievement, the use of data to increase student performance has emerged as conceivably the dominant improvement approach (Means et al., 2010).

Numerous forces have converged to make DDDM at all levels of education a priority in schools (Means et al., 2010; Wilkins & Shin, 2010), with districts initial acquirement of data systems, as well as utilization of student performance data being guided by national accountability requirements (Means et al., 2010). As reauthorized in 2002, the Elementary and Secondary Education Act (ESEA), requires the gathering, interpretation, and use of student achievement data to improve student outcomes. Additionally, the ESEA has requested schools report their student performance data (e.g., annual yearly progress). In so doing, data systems in schools are anticipated to play an integral function in bettering educational decision making at all grade levels and will include the classroom teacher (Means et al., 2010).

The No Child Left Behind (NCLB) act of 2001 emphasized data use in schools at all levels of education. NCLB made schools accountable for student achievement by mandating routine assessments to monitor student progress ("NCLB: A Toolkit for Teachers", 2004). Moreover, to highlight the significance of data-use in education, NCLB incorporated phrases such as “evidence-based decisions” and “scientifically based research” 111 times, according to one tally provided by Mann and Shakeshaft (2003). In response, schools have taken steps to improve their student data systems (Means et al., 2010).

In reaction to educational policy, local school officials (e.g., administration) are promoting a need for more DDDM in the classroom. A survey conducted by Coburn and Talbert (2006) found that superintendents at the district level selected data use as the most important strategy for guiding decisions to improve student performance. In another study, school personnel were found to be in agreement, noting the greatest area of need in school districts was knowledge of how to connect student performance data to instructional practice (Means et al., 2010). Furthermore, 80% of districts were said to be in need of more specific examples of good practice in the examination of data to improve outcomes in student performance (Means et al., 2010). Teachers have conveyed a limited understanding of how to use the data they have collected to drive instruction and educators are asking for further assistance in knowing how to best use DDDM for instructional improvement (Young & Kim, 2010).

There is a limit to what educators have been taught about data collection and there is also insufficient knowledge of how to modify instruction to advance achievement based on assessment data (Young & Kim, 2010). Unfortunately, the educational policies set in place to mandate data collection fall short of providing training to educators to support the effective execution of DDDM (Wayman et al., 2005). Consequently, many schools continue to struggle with conceptualizing ways to most effectively gather and use data to promote student progress (Wayman, Cho, & Johnson 2007).

Professional Development

The Department of Education reported that school districts are making an effort to progress the capacity by which schools use data for educational decision making (Means et al., 2010). Administrators are also emphasizing the importance of training teachers to use data to guide their own instructional planning, noting the importance of creating and modeling a culture of professional development around understanding data (DDDM Based on Curriculum-Embedded Assessment, 2006).

In an effort to identify the prevalence and barriers of DDDM in districts and schools across the country, the U.S. Department of Education recently sponsored a national survey (in the 2006-2007 academic year) study to gather more information (Means et al., 2009). The investigation identified the lack of expertise among school staff members in the area of data analysis as a significant barrier to the proper implementation of data-informed decision making (Means et al., 2009). In addition, professional development was targeted as an essential prerequisite and support that is necessary for data-informed decision making to be successful (Means et al., 2009). Of the teachers surveyed, 39 % reported the professional development they received on DDDM prepared them to use data to improve student achievement (Mean et al., 2009). Teachers also reported additional professional development on the topic of DDDM would be beneficial (Means et al., 2009) to their proficiency on the subject.

In a follow-up study on the use of educational data at the school level, Means et al. (2010) reported one of the top three strategies for building schools' capacity for using data were professional development activities. The concluding recommendation was to train teachers on how to more effectively use data in their classroom. In particular, this study pointed out the necessity for teachers to be provided with knowledge of how to utilize data to analyze student achievement (Means et al., 2010). Additionally, teachers wanted to know how to effectively adapt their instructional practices to meet the academic needs of students (Means et al., 2010) or how to modify their instruction to improve students' academic performance. Existing research provides evidence to suggest that without more professional development, teachers will continue to feel unprepared to use DDDM (Means et al., 2009; 2010; Young & Kim, 2010) for curriculum planning.

An array of literature is available to support the role of professional development in changing teachers' behavior or instructional practice in the classroom. Wolff, McClelland, and Stewart (2010) recently published research on the relationship between schools attaining adequate yearly progress (AYP) and professional development. AYP status entails that advanced achievement standards be reached by all students (Wolff et al., 2010), which requires highly efficient teaching practices on the part of educators. Findings from a survey study conducted in 2005-2006, with a sample of 5,558 teachers, revealed educators' were in agreement that professional development contributed to AYP in the following ways (2010): (a) advanced teachers' understanding of instructional strategies derived from scientifically based research; (b) forwarded teachers' understanding of effective instructional strategies for improving student academic achievement;…(c) helped teachers effectively use technology in the classroom to improve instruction and learning" (p. 304).

Research literature promotes the use of quality professional development as one way to positively influence changes in instructional behavior (Wolff, et al., 2010). Porter, Garat, Desimore, Yoon, and Birman (2000) reported that as a result of just one professional development session on instructional strategies, teachers' use of the strategies increased in the field. Hargreaves (2007) emphasizes, "Student learning and development do not occur without teacher learning and development" (p. 37).

Additional literature was found to support the use of job-embedded professional development, which refers to training received by teachers as part of their job and in the schools (Loucks-Horsley, 1995), to be successful in changing teachers' instructional behavior (Guskey & Yoon, 2009; Loucks-Horsley 1995). Job-embedded trainings (like that of the in-service training used in the current study) could be more effective, because the association between learning and application increases meaning for teachers and the potential effects on student learning outcomes (Guskey & Yoon, 2009). Furthermore, Guskey (2003) found "The most frequently mentioned characteristic of effective professional development (to be the) enhancement of teachers' content and pedagogic knowledge" (p. 9). That is effective professional development is characterized by teachers to target their instructional content and relate to the practice of teaching.

Educators' Perceptions

Traditionally teachers have based their instructional decisions largely on "experience, intuition, and anecdotal information (or professional judgment)" rather than systematically gathered information (Ingram, Louis, & Schroeder, 2004, p. 1281). This is a distinct barrier in moving teachers toward the use of systematic data collection and analysis (Young & Kim, 2010). However, research has also shown that influencing teachers' beliefs could very well promote follow-through in their instructional behavior and help guide data-driven continuous improvement efforts (Young & Kim, 2010).

Teachers' perceptions have been reported as the filter through which new teaching methods are interpreted and carried out during instruction (Borko et al., 1997). According to a study by Borko et al. (1997), the impact of teachers' beliefs is recognized as instrumental to their instructional behaviors. Borko et al. (1997) found teachers' perceptions to be important to the generalization of training effects to a change in practice, and for that reason explicit attention to teachers' beliefs, in addition to assessment practices, should be integrated into future trainings.

In an up to date review of literature on using assessment for instructional improvement, Young and Kim (2010) report the extent to which data effectively advance instructional practice in schools is greatly influenced by educators' pedagogical view, in addition to the relevancy, usefulness, and accessibility of the data. Furthermore, the degree of emphasis that teachers allocate to various types of data depends largely on their perception of the educational significance of the information gathered (Borko et al., 1997; Young & Kim, 2010; Young, 2008). Given these findings, the current study was designed to target teachers' perceptions as the basis for determining generalization of training outcomes to teachers' instructional practice (behavior).

Statement of Problem

Although a need for professional development has been established in the extant literature, research is limited regarding how to successfully use in-service training as a tool to enhance the implementation of DDDM in schools. Furthermore, though teachers' beliefs have been found to impact all aspects of instructional practice (Borko et al., 1997; Young & Kim, 2010), there remains a need for research to investigate the influence of in-service training on educators' perceptions of DDDM in particular. If the training used in this study was found to improve educators' perspectives of DDDM, thereby tapping into pedagogy, then data driven methods of instruction may generalize to the classroom. That is, changes in teachers' perceptions of DDDM could conceivably impact changes in the instructional behavior of educators.

Purpose of Study

The current investigation was designed to provide information regarding educators' perceptions of using student achievement data to guide instruction in the classroom. This study was derived from an up to date literature review of empirical research on using assessments for instructional improvement conducted by Young and Kim (2010). Researchers found the extent to which data effectively advance instructional practice is influenced by teachers' pedagogical view, perceptions, and the relevancy, usefulness, and accessibility of the data (Young and Kim, 2010).

The purpose of the current study was twofold. First, the investigation aimed to understand educators' initial perceptions of DDDM prior to an in-service training session. Second, the current study sought to identify whether the training had a meaningful impact on teachers' perceptions by evaluating changes in perceptions after the training. This investigation also intended for the outcomes presented here to be used to guide future research on the use of professional development as a tool for improving the generalization of DDDM into changes in classroom instruction.

Research Questions

This study was designed to answer the following research questions:

1. What are educators' initial perceptions of DDDM prior to an in-service training?

2. In what ways did the in-service training influence changes in educators' perceptions of DDDM?

Hypotheses

1. Baseline data would show educators' initial perceptions of the procedures used to implement DDDM to be limited and their support of the DDDM process to be low.
2. The in-service training would have a significant impact on improving educators' perceptions of DDDM.

CHAPTER 3: Methodology

This chapter provides a description of the methods used to address the research questions previously proposed in this study. In particular, the following are described in detail: the participants, setting, investigator, baseline or pre-assessment, post-assessment, dependent variable, procedures and training conditions, experimental design, and social validity.

Participants

A total of 63 educators participated in the current study as part of an educational training opportunity. Table 1 illustrates a breakdown of the demographic information for the participants of the present study.

Table 1

Frequency and Percent of Participants in each Demographic Category

Demographic Categories	*Frequency*	*Percent*
Gender		
Male	9	14.3
Female	53	84.1
Not Indicated	1	1.6
Ethnicity		
Caucasian	57	90.5
African American	3	4.8
Hispanic	1	1.6
Asian	1	1.6
Not Indicated	1	1.6
Highest Degree of Education		
Bachelors	31	49.2
Masters	24	38.1
Masters + 30 hours	7	11.1
Doctorate	1	1.6
Grade Currently Teaching		
Pre-Kindergarten	6	9.5
Elementary School	38	63.3
Middle School	17	27
High School	2	3.2
Current Education Setting		
Special Education	2	3.2
General Education	56	88.9
Not Indicated	2	3.2
Years of Teaching Experience		
0-5	15	23.8
6-11	16	25.4
12-17	10	15.9
18 (+) or more	19	30.2
Not Indicated	3	4.8

Setting

The investigation was carried out at an elementary school in a southeastern metropolitan area of the United States. The school district serves students from low to middle socioeconomic status, with 55.7 % of students on free and reduced lunch, just above the state average of 46 % (Anne E. Casey Foundation, 2009). Students in preschool through 12th grade attended the local school district.

Within the school, the investigation was conducted in an auditorium designed for presentations. The room contained theatre style (raised) seating and was equipped with a lighting and sound system (with microphone), in addition to temperature controls that were adjustable. There was a laptop computer that sat on top of a podium at the front of the room. A large screen used for projection was fixed in the center/front of the room. The location was quiet and relatively free from potential distracters.

The Investigator

The investigator is a graduate student enrolled in the doctor of education program at the University of Memphis, with a concentration in applied behavior analysis (ABA). She holds a master's degree plus 30 graduate hours from The Ohio State University and is a nationally certified school psychologist. The investigator has taken courses in reading instruction at The Ohio State University including, remedial and clinical reading instruction and linking academic assessment to intervention. The investigator's most recent coursework from the University of Memphis was acquired from the department of instruction and curriculum leadership in the content areas of ABA and instruction in special education.

Pre and Post-Assessment

Participants' perceptions of DDDM were assessed twice in this study with two self-administered questionnaires. Each of the nine “Survey Items” (see Appendix A) on the questionnaires have been established in existing research to illustrate the process and procedures used in a DDDM framework.

Item one addressed formative assessment and is based on a sizable literature base suggesting formative measures are best for producing timely results that teachers can use to guide ongoing instruction (Bell & Cowie, 2001; Black & Wiliam, 1998; Boston & Carol, 2002; Garrison & Ehringhause, 2007; Kaftan et al., 2006). Item two targeted CBM as a progress monitoring tool. Capizzi and Fuchs (2005) and Clark (2009) reported CBMs as the most frequently used and well-researched method of monitoring student progress.

Survey items 3 and 5 are supported by the research of Fuchs and Fuchs (2005) which highlight the importance of graphing data to illustrate student performance overtime, and analyzing trends in the data to guide instruction. In addition, Means et al. (2010) indicated teachers need to better understand how to modify instruction to improve student performance based on trends in the data. Items four and item six emphasize graphing technology, and understanding computer software to improve the efficiency of a data-decision framework (Fuchs et al., 2006; Stecker et al., 2005).

Finally, items 8 and 9 compare teachers overall views of the DDDM process to the use of professional judgment. These questions address the research conducted by Ingram et al. (2004) and Young and Kim (2010) and their findings which state that teachers traditionally base their instructional decisions largely on experience, intuition and anecdotal information rather than systematically gathered data.

In the baseline condition, participants rated their perceptions of DDDM on a self-administered pre-assessment questionnaire (see Appendix 1). The questionnaire consisted of a series of nine 5-point Likert Scale survey items with response options ranging from "strongly agree" to "strongly disagree." The pre-assessment also included a demographic information section in which participants indicated the following: their gender, ethnicity, highest degree of education, grade currently teaching, current education setting, and years of teaching experience. All are displayed in Table 1.

The pre-assessment was attached to the post-assessment for the purpose of matching participants' responses to both questionnaires. For the post-assessment, participants were asked to rate their perceptions of DDDM on a post-test questionnaire (see Appendix 2), provided after the in-service training. The post-assessment also contained a series of nine survey items (which were the same nine items presented in the pre-assessment questionnaire) that asked participants to provide ratings on a 5-point Likert Scale. Post-test responses were compared to pre-tests responses to determine changes in perceptions as a result of the training.

In addition to the DDDM survey items, the post-assessment contained four training effectiveness questions labeled "rate this training". These appeared at the bottom of the questionnaire. Training Effectiveness questions were presented on the same 5-point Likert Scale. On these items participants rated their views of the overall usefulness of the training. This was also a measure of social validity. The Likert scale items presented on both the pre- and post-assessment questionnaires corresponded to the training objectives described in the procedures section of this study.

Note the investigator did not provide prompting or assistance to participants during the pre- or post-assessment. If a participant asked for clarification on a survey item the standard response was, “please provide your best answer.”

Confidentiality. Participation in this study was voluntary. To obtain consent for participation, each individual in attendance was given a “Consent for Participation” statement to read (see Appendix 3). The statement informed educators that participation was voluntary, that the data collected during the training would be used for research conducted by a doctoral graduate student the local university, and that information would be kept confidential within the limits allowed by the law.

To further ensure participants’ privacy, pre- and post-assessments were matched and provided to educators as a pair of questionnaires. A pair of questionnaires contained one pre-assessment and one post-assessment questionnaire labeled with a number. For example, pre-assessment 1 was paired with post-assessment 1, pre-assessment 2 paired with post-assessment 2, pre-assessment 3 with post-assessment 3, and so on. Pairs of questionnaires were shuffled and one pair was placed on each available seat in the auditorium prior to the training.

Dependent Variable

The dependent variable for the current study was educator perceptions. Educator perceptions are considered by the literature to be relevant to pedagogical views (e.g., method of teaching) (Young & Kim, 2010). A perception rating from 1 to 5 was assigned based upon participants’ responses to each item on the pre- and post-assessment questionnaire. Perception ratings included: a rating of 1 for a response of “strongly disagree”, 2 for a response of “disagree”, 3 for “neutral”, 4 for “agree”, and 5 for “strongly agree”. All omitted responses to items (e.g., items in which a response option is not chosen by the participant) were coded separately (e.g., assigned a different number such as 99 for example) and removed from the results of the investigation.

Procedures

Training condition. The present study was a replication of a smaller pilot study carried out by the investigator and an assistant professor of special education in spring of 2010 as a residency research project presented in partial fulfillment of the requirements for the doctorate of education degree. Thirteen subjects participated in the pilot. One purpose of this current study was to increase the overall sample size from that of the pilot project to strengthen the external validity of the findings. In the pilot investigation, participants’ pretest mean scores indicated, the educators’ believed using data-based decision making to inform instruction was important; however, formative assessment measures were viewed as unfamiliar. Results offered support for the use of in-service training in order to improve educators' perception of data-driven instruction. Five out of the nine survey (perception) items scores significantly improved ($p<.05$) after the training session. The procedures for implementation for the current investigation were identical to those of the pilot study. What follows, is a description of the training procedures.

The in-service training session used for the present study was titled “Using Data to Drive Instruction.” The 90-minute training was delivered by the investigator in lecture format using a PowerPoint presentation. Group choral responding and whole group practice exercises were integrated into the presentation in an effort to promote acquisition of learning. In addition, the investigator provided verbal praise to the participants intermittently throughout the in-service to positively reinforce educator participation.

Example praise statements included: “good response,” “thank you for sharing,” “that’s correct,” and “excellent.”

The 90-minute training session covered the DDDM process and procedures for implementation. The training was developed based on a review of educational assessment literature by Young and Kim (2010) and a study conducted by Stecker et al. (2005) on using CBM to improve student achievement in reading. The training focused on the use of assessments for instructional improvement, as well as provided information on the relevancy, usefulness, and accessibility of formative data (Young and Kim). With the goal of training being to create conditions that would demonstrate how to use CBMs at the classroom level to improve student achievement (Stecker et al., 2005).

The key components of the training were designed to best assist teachers with the proper implementation of DDDM in schools. These included (Stecker et al., 2005): (a) training on CBM, (b) utilization of a data-decision framework, (c) a working understanding of computer software to make efficient use of data, and (d) ongoing support to devise and implement instructional changes for the students. Additionally, the training taught and provided examples of the following skills (Stecker et al., 2005): collecting data, graphing data, analyzing trends in the data, and making appropriate instructional adjustments.

The Using Data to Drive Instructional Decisions in-service training session was organized by the specific training objectives shared at the beginning of the PowerPoint presentation (see Appendix 4 for presentation outline). The training objectives were taught in the sequence that follows:

1. Summative versus formative assessment

2. Introduction to CBM (Capizzi & Fuchs, 2005; Stecker et al., 2005)
3. Graphing data in Microsoft Excel (e.g., histograms)
4. Graphing technology (e.g., web-based program ChartDog®),
5. Analyzing student performance data (e.g., how to interpret goal line and a trend line on a graph)
6. Using academic data to guide instructional modifications (e.g., proceed with current instruction; modify instruction; change student performance goal; etc.).

Experimental Design

In order to address the research questions, the current study used a repeated measures Analysis of Variance (ANOVA) design and conducted a series of paired-sample t-tests. A repeated measures ANOVA allows for the measurement of the dependent variable to be repeated across several measures (Cooper et al., 2007). In this study, analyses allowed for the measurement of educator perceptions following the training condition with comparisons across several questionnaire items. The repeated measures design is also a within-subject design because each participant in the study is exposed to the training (or treatment) condition (Cooper et al., 2007).

Social Validity

This study also investigated the participants' views of the usefulness or effectiveness of the in-service training session to demonstrate social validity of the results. Training effectiveness was evaluated using the last four Likert scale items on the post-assessment questionnaire labeled "rate this training." A Cronbach's alpha was computed to indicate whether the "rate this training" items were a reliable measure of effectiveness (Cronbach, 1951), and are reported below as the Training Effectiveness Scale.

CHAPTER 4: Results

This chapter presents the results of the study according to the research questions posed in chapter 1 and outlined in the text that follows. Here, educator perceptions are presented for the baseline (pre-assessment) condition along with the results concerning the dependent variable of educator perceptions obtained following the training condition. The results were analyzed with a repeated measures experimental design, using paired sample t-tests. Following the statistical results, the social validity findings from the Using Data to Drive Instructional Decisions training are provided.

What are Educators' Initial Perceptions of DDDM?

This study investigated educators' initial perceptions of DDDM by administering a pre-assessment questionnaire prior to the training condition. Initial perceptions were calculated as an average of all participants' ($n = 63$) responses to each of the nine Likert scale survey items provided on the pre-assessment questionnaire and are reported as mean pre-test scores.

The questionnaire items presented in the first column of Table 1 appear in order from item 1 through item 9. For example, questionnaire item one is, "I know how to graph, collect, and analyze formative data" and it can be located in the first row under the column labeled "Questionnaire Item." Item 9 which is "Collecting data takes too much time away from instruction" can be found in the last row of the same column labeled "Questionnaire Item." Pre-test scores are reported on a 5-point Likert Scale as follows: a score of 1 indicates a response of "strongly disagree," a score of 2 is a response of "disagree," 3 is "neutral," 4 means "agree," and 5 is "strongly agree." The second column of Table 2 illustrates the mean pre-test scores for items 1 through 9 of the pre-assessment.

Pre-test mean scores fell in a range from 2.76 to 3.43. The lowest score of 2.76 appeared for item 7, indicating participants' mean pre-test score fell in a range from disagree to neutral in response to the statement, "I believe that using data to drive instruction is too time consuming." The highest mean score of 3.43 was found for item one with a rating of neutral to agree in response to the statement, "I know how to graph, collect, and analyze formative data." Additional mean pre-test scores include the following: a score of 3.18 for questionnaire item 2, a score of 3.39 for questionnaire item 3, a score of 3.13 for item 4, a score of 2.89 for item 5, a score of 3.38 for item 6, a score of 2.92 for item 8, and a score of 2.98 for item 9 (refer to Table 2).

Table 2

Mean Pre-test, Mean Post-test, Mean Difference, t-value, per Questionnaire Item/Pair

Questionnaire Item/Pair	Mean Pre-test	Mean Post-test	Mean Difference	t
I know how to collect, graph, and analyze formative data.	3.43	3.65	-.222	-1.507
I understand how to use curriculum-based measurement (CBM) to monitor my students' reading progress throughout the academic year.	3.18	3.70	-.524	-2.658*
I believe graphing data can objectively and accurately inform my instructional decisions.	3.39	3.63	-.242	-1.899
I can easily make my own line graph in Microsoft Excel.	3.13	3.51	-.381	-2.114*
I know how to describe the relationship between an Aim (goal) Line and the Trend Line on a graph to determine if a student is making progress.	2.89	3.39	-.492	-2.187*
I believe using data to drive my instructional decisions is important.	3.38	3.49	-.111	-1.044
I believe that using data to drive instruction is too time consuming.	2.76	2.81	-.048	-.335
As a teacher I know when a child is ready to move on to a new skill or needs remediation, I do not need to collect ongoing data.	2.92	2.94	-.016	-.129
Collecting data takes too much time away from instruction.	2.98	2.89	.097	.830

Note. $N = 63$, * $p<.05$.

In What Ways Did the In-Service Training Influence Changes in Educators' Perceptions of DDDM?

This study investigated changes in perceptions from pre to post assessment to determine to what extent the in-service training had an effect on educators' perceptions of DDDM. To analyze the results, mean differences in scores were evaluated to identify the occurrence of statistically significant differences in participant ratings from pre-assessment to post-assessment for the nine pairs of questionnaire items presented in the DDDM training condition. Paired samples t-tests were computed for each pair of items. Questionnaire items were paired as follows: pre-assessment question one was paired with post-assessment question one, pre-assessment question two with post-assessment question two, and so on. Again, mean scores are reported on a 5-point Likert Scale as follows: a score of 1 indicates a response of "strongly disagree," a score of 2 is a response of "disagree," 3 is "neutral," 4 means "agree," and 5 is "strongly agree."

Table 2 illustrates the mean pre-test, mean post-test, mean difference, and t-values for each questionnaire item pair (organized in sequence from questionnaire pair one through pair nine). The asterisks next to t-values in the table identify items that were found to be statistically significant at $p<.05$. Note that the majority of the mean difference scores and t-scores in Table 2 appear as negative values. A negative score represents an increase in the mean score from pre-test to post-test whereas a positive score illustrates a decrease in mean value from pre- to post-test. Notice for example that the values for item pair two include a pre-test mean score of 3.18, a post-test mean of 3.70, a mean difference of -.524, and a t of -2.658. The mean difference of -.524 represents the increase in mean scores from pre-test (3.18) to post-test (3.70) and that the mean difference in scores is statistically significant (*t* = -2.658, p<.05), as indicated by the asterisks that appear adjacent to the scores in the table. Conversely, item pair 9 has a pre-test mean of 2.98, a post-test mean of 2.89, a mean difference of .097, and a *t* equal to .830. In this example, the mean difference of .097 indicates a decrease in mean scores from pre-test (2.98) to post-test (2.89) and that this mean difference in scores is not statistically significant (p<.05).

According to the results of the paired sample t-tests, a meaningful change in educators' perceptions of their skills related to the implementation of DDDM was observed for three of the nine pairs of questionnaire items. A statistically significant difference in scores was found for item pair 2 (*t = -2.658,* p<.05), pair 4 (*t = -2.114,* p<.05), and pair 5 (*t = -2.187*, p<.05). For all three significant pairs the mean difference in scores increased from baseline to the training condition. Therefore, it appears that three of the nine aspects of the training were useful based on these findings. An examination of each individual pair provides a better understanding of the change in participants' perceptions.

Item pair 2 is the first significant pair that appears in Table 1 and it is listed as, "I understand how to use curriculum-based measurement (CBM) to monitor my students' reading progress throughout the academic year." For pair 2, there was an increase in mean scores from a pre-test mean of 3.18 to a post-test mean of 3.70 (with a mean difference of -.524). These results indicate participants endorsed a significantly higher rating of understanding how to use CBM to monitor students' reading progress as an outcome of the training. Item pair 4 was also found to be statistically significant with a mean pre-test score of 3.13, a post-test mean of 3.51, and a mean difference of -.381. For item pair 4, participants responded to the statement, “I can easily make my own line graph in Microsoft Excel.” A significant increase in the mean difference in scores for this item pair signifies that a meaningful increase in participants’ ability to make a line graph in Microsoft Excel was shown subsequent to the training. Finally, a significant change was found for item pair 5, in which participants responded to the statement that follows: “I know how to describe the relationship between an Aim (goal) Line and the Trend Line on a graph to determine if a student is making progress.” For pair five, the mean pre-test of 2.89 increased to a mean post-test score of 3.39 (with a mean difference in score of -.492) demonstrating a significant improvement in participants’ understanding of how to describe a goal line and trend line on a graph and determine student progress following the training. The significant differences described here explain changes in participants’ perceptions of their ability to carry out specific procedures involved in DDDD.

Questionnaire item pairs 1, 3, 6, 7, 8, and 9 were not statistically significant, however these findings remain noteworthy. For these remaining items (with the exception of pair nine) an increase in mean scores was seen for each pair. Findings illustrate that a small degree of improvement in perceptions of DDDM (although not significant) was observed following the training condition. Note that because these changes could be due to random error, rather than a true difference in perceptions, conclusions for non-significant items should be interpreted with caution.

Social Validity/Training Effectiveness

Overall, according to participants’ (n = 63) ratings the in-service training was found to be useful and highly efficient in all categories assessed. The effectiveness of the training was measured by educators' ratings of the last four items of the post-test labeled "rate this training." These items were combined to form a Training Effectiveness Scale. To measure the reliability of the items contained within the scale, or in other words to make certain the items measured the same construction of training effectiveness, a Cronbach's Alpha was computed. To maintain consistency of results, effectiveness scores are reported on a 5-point Likert Scale as follows: a score of 1 indicates a response of "strongly disagree," a score of 2 is a response of "disagree," 3 is "neutral," 4 means "agree," and 5 is "strongly agree." Effectiveness scores are reported next.

The analysis resulted in a good Cronbach's Alpha of .962, which supported the Training Effectiveness Scale as a reliable measure. Results demonstrated participants agreed that the training was effective with a mean score of 3.58. The mode score of 4.00 specifies participants most often selected "agree" when responding to the statements provided in the Training Effectiveness Scale. These statements included, "this training was useful," "I learned a lot from this training," I would recommend this training to other teachers," and I will use data in my classroom."

CHAPTER 5: Discussion

This study investigated teachers' preliminary perceptions of DDDM and changes in perceptions subsequent to the 90-minute Using Data to Drive Instructional Decisions training session. The present study measured educator perceptions before and after an educational training to determine whether or not the training session was a useful strategy to improve teachers' views of DDDM. In this chapter, findings of the current study are presented below according to the two research questions. Results are further discussed in light of past research. Limitations of the current study, as well as suggestions for future research and implications for practice are also provided.

What are Educators' Initial Perceptions of DDDM?

The first research question posed in this study sought to identify teachers' preliminary (pre-training) views on DDDM. More specifically, teachers were asked to provide ratings of their beliefs relative to the basic procedures used to apply DDDM as part of instructional practice. These procedures included for example, collecting student data (e.g., with formative assessments and CBMs), graphing data, and analyzing data to determine student progress. Teachers were also asked to rate their general beliefs of the DDDM process (e.g., how important is data in guiding instructional decisions; is DDDM a time efficient method).

The investigator hypothesized teachers' initial perceptions of the procedures involved in DDDM would be limited. In other words, teachers' responses would indicate little experience (e.g., choosing to strongly disagree or disagree with items presented on the pre-questionnaire) with collecting, graphing, and analyzing student achievement data.

Furthermore, teachers' views of DDDM in general were also projected to contain limitations with pre-test ratings in opposition of the DDDM process.

Hypotheses were based on a recent review of educational assessment literature provided by Kim and Young (2010) as well as in part by a study conducted more than 50 years ago by Noll (1955). Both studies confirmed teachers consider their training in educational assessment left them unprepared to implement DDDM in schools. Furthermore, the U.S. Department of Education recently sponsored a national survey study to investigate barriers of DDDM in districts and schools across the country (Means et al., 2009). The investigation identified a lack of expertise among school staff in the area of data analysis as a significant barrier to the proper implementation of DDDM (Means et al., 2009), again pointing to teachers' limited experience with data driven instruction.

Results of the current investigation indicated that prior to the training session educators' were slightly more accepting of the process and believed to know more about implementation procedures involved in DDDM, than was originally hypothesized. This conclusion was based on pre-test ratings that ranged from the lowest response score of 2.76 to the highest response score being 3.43 (see Table 2). More specifically, when presented with a (DDDM process) statement such as, "I believe that using data to drive instruction is too time consuming," teachers were somewhat more accepting than was expected (e.g., ratings ranged from disagree to neutral). Moreover, when asked about data use (e.g., in response to a DDDM procedure item) teachers were neutral to in agreement with regard to the statement, "I know how to graph, collect, and analyze formative data."

Although preliminary perspectives of DDDM were better than projected, there was still room for improvement. Teachers' acceptance level was in the neutral to agree range, which indicated the need for training was present. In other words, educators' initial responses did not illustrate readiness to implement DDDM in the classroom.

In What Ways Did the In-Service Training Influence Changes in Educators' Perceptions of DDDM?

In a nationwide survey study, the U.S. Department of Education targeted professional development as an essential prerequisite and support necessary for data-informed decision making to be successful (Means et al., 2009). Although, in-service training is recognized as potentially the most useful strategy to improve DDDM (Means et al., 2009), research literature also supports the impact educators' beliefs have on their instructional behavior (Borko et al., 1997; Young & Kim, 2010). For instance, traditionally teachers have been found to base their instructional decisions largely on "experience, intuition, and anecdotal information (or professional judgment)" rather than systematically gathered information (Ingram et al., 2004). According to Young and Kim (2010), this is a distinct obstacle in moving teachers toward the use of systematic data collection and analysis. However, research now shows that by impacting teachers' beliefs and pedagogy we may be able to guide educators toward data-driven improvement efforts (2010).

Although, professional development is shown to influence teachers' instructional behavior, there is limited evidence regarding the use of professional development to specifically increase the effectiveness of the implementation of DDDM in schools. Additionally, there is a need for research to investigate the influence of in-service training on educators' perceptions of DDDM because teachers' beliefs have been found to impact all aspects of instructional practice in the classroom (Borko et al., 1997; Young & Kim, 2010). The present study focused on teachers' perspectives of DDDM in response to a training session in order to investigate methods to promote the effectiveness of DDDM in schools.

Based on research literature, the second research question posed in this study sought to examine the influence of in-service training on teachers' perceptions of DDDM. The researcher hypothesized that the training session would have a significant impact on improving educators' perceptions of the DDDM process and implementation procedures. In other words, it was anticipated that teachers' ratings (following the training) would indicate a meaningful improvement in their views of DDDM, which would support generalization of the concepts taught into classroom instruction.

The findings of this investigation demonstrate a significant change occurred for one-third of the questionnaire items presented (see Table 2). These items described skills needed to effectively implement DDDM as part of classroom instruction. Findings indicate the training was useful in producing a meaningful change in teachers' perspectives of their ability to administer DDDM procedures. More specifically, as a result of the training educators endorsed significantly increased skill in using CBM to monitor students' progress in reading. In addition, teachers' understanding of how to make a graph in Microsoft Excel improved greatly. Also, after the training, educators rated substantial gains in understanding how to describe the relationship between a goal line and a trend line on a graph to determine if adequate progress. Therefore, findings support the training session had a meaningful influence on teachers' perceptive of

DDDM implementation procedures; indicating an improvement in perceptions as hypothesized.

Alternatively, when considering beliefs of DDDM in general, findings illustrate teachers' perceptions related to the process of DDDM did not change significantly. Items describing acceptance of DDDM were not seen to increase post training. The improvements seen were not significant and therefore deductions cannot be made with certainty. Consequently, the training session did not have a significant impact on improving perceptions of the DDDM process as was hypothesized.

Social Validity

To better understand the impact of the training on educators' perceptions, the study also measured the social validity of the training based on educators' endorsement of its usefulness in teaching and learning. In general, social validity examines the overall importance of training on the participants involved. Results demonstrated teachers agreed the training was effective. Teachers' rated the training as useful and indicated that they learned a lot from the in-service session. In addition educators agreed that they would recommend the training to other teachers and they would use data in the classroom.

Given that educators indicated they would use data in the classroom in response to a "rate this training" item, it is plausible that teachers' overall perceptions of DDDM were influenced by the training. Unfortunately, a change in perceptions cannot be determined as a result of these findings because the pre-assessment did not address this question in particular.

Limitations

Despite the current findings that support the use of in-service training as a promising technique to promote educators willingness to use of DDDM procedures in schools, this study was not without limitations. First, the current study was conducted with a relatively small sample of 63 educators. The small sample size decreases the ability to generalize these results, also reducing the external validity of the investigation. Therefore, it is difficult to determine whether these same findings would hold true without further empirical support. Second, the present study compared teachers' views of DDDM with a pre-assessment and a post-assessment, but did not provide a follow-up questionnaire to teachers, therefore making it challenging to determine maintenance of results overtime. Third, this study administered only one training session to participants, which provided a limited understanding of the impact of additional trainings on teachers' perceptions in the course of an academic year.

Fourth, the results of the current study were a direct response to the "Using Data to Drive Instruction" training. Therefore, it is reasonable to conclude that results may vary based on the type of training (e.g., if the emphasis of the training changed). Any conclusions made here, are limited to the specific training used in this study to train teachers on DDDM. Also, this particular training could have targeted teachers' perceptions of DDDM better. Results indicated the training was useful in changing perceptions of skill (or ability) level, but did not produce change in overall beliefs of the DDDM process.

Lastly, access to the pre-assessment questionnaire at the time the post-assessment questionnaire was completed may have influenced (or skewed) participants' ratings in response to the training condition. This could have been avoided with the following techniques: (a) a control question on the pre- and post-assessment (that was irrelevant to the training condition) could be used to measure the reliability of participants' responses from the pre- to post-test; and (b) counter balancing the order of the questions on the pre- and post-assessment could also control for validity of responding.

Future Research

Findings generated from the current investigation could be used to guide prospective studies using professional development to improve data driven instruction in schools with the following suggestions for future research. The present study involved a limited representative sample of participants relative to the population of interest (e.g., educators teaching kindergarten through 12th grade). As a result, additional research is needed to replicate the current study and support the findings presented here. For example future studies, may aim to work with more educators comparing differences in perceptions based on the following: years of teaching experience, general education versus special education, degree of education obtained, or by gender. Generalization of findings beyond the sample population can also be enhanced by means of random sampling.

Given that the present study did not follow-up with participants to determine maintenance of results overtime, future investigations should provide one or more follow-up questionnaires to the teachers some time after the training session. In addition, it may be beneficial for future researchers to follow-up with a serious of trainings on DDDM, for instance one or more booster training sessions over the course of a school year. In so doing, future studies would likely advance acquisition and proficiency of learning of the concepts taught.

Implications for Practice

The findings of the current investigation have implications for teachers and other professionals in the field of education. The results demonstrate that a brief in-service training on DDDM was useful in changing teachers' views on the subject matter. As an outcome of their participation in this study, teachers indicated they would use data as part of their instructional routine in the classroom. Therefore, exposure to this investigation may lead teachers to understand the value of a data-driven method of instruction on improving student achievement. Furthermore, teachers may be more likely to try DDDM with their students as a result of the conclusions shared here, because findings demonstrated an increase in skills needed to implement a method of data-driven instruction.

These findings also hold implications for support service personnel in schools, such as school psychologists, school social workers, and school counselors. These staff members often consult with teachers when intervening to support students who are struggling academically. During the consultation and student support process, various types of student and classroom data are available to assist in targeting interventions for students. It is important for school support personnel to understand the implications of teachers' pedagogical views have on their instructional practice to make DDDM relevant to the function or work of a teacher. Teachers currently using a DDDM approach to instruction for example would have a greater understanding of how to analyze student data to make instructional modifications and monitor progress with formative assessments such CBMs. On the other hand, those educators who are new to DDDM and take a more traditional approach based of anecdotal evidence may need to be introduced to the DDDM process before techniques can be used effectively to guide instruction.

On the part of administrators and leaders in instruction and curriculum, careful consideration should be given to the use of effective and empirically supported methods of instruction. Therefore, the current study has implications on professional development options offered to educators as part of in-service training. The fact is, educators admit the need for training in DDDM and endorse a limited understanding of how to effectively implement a data-driven method of instruction. If school districts intend to keep up with educational policies such as NCLB (2001) and the ESEA (2002) that require the routine collection and reporting of student data, teachers need more opportunities for on the job training. Findings of this study confirm past research, which suggests teachers would benefit from greater exposure to training on the analysis of student data.

Conclusion

The results the current investigation suggest that an in-service training session may produce positive effects on teachers' perceptions associated with the implementation of DDDM in schools. Furthermore, these results indicate professional development could affect changes in the way data are used to guide instruction. Further research is needed to support the findings reported here; however, this study highlights the importance of considering teachers' pedagogy and perceptions when planning professional development to address DDDM. In so doing, trainings have the potential to influence changes in teachers' behavior and instructional practice.

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Appendix 1

Pre-Questionnaire

Demographic Information

As indicated below, please circle or provide a written response:				
Private school type:	Catholic Diocese	Independent/Private	Other__________	
Grade currently teaching (circle):	Elementary School	Middle School	High School	Other _______
Current educational setting (circle):	Special Education	General Education	Both/Describe _________	
Years in education (i.e., teaching):	_____________			
Gender (circle):	Male	Female		
Ethnicity (circle):	Caucasian Other ________	African American	Hispanic	Asian
Highest Degree Completed (circle):	Associates Ed.S.	Bachelors Doctorate	Masters Other________	Master + 30

Survey Questions

Please complete each item by circling one of the following:
Strongly Disagree = SD; Disagree = D; Strongly; Neutral = U; Agree = A; Agree = SA;

	SD	D	N	A	SA
1. I know how to collect, graph, and analyze formative data.	1	2	3	4	5
2. I understand how to use curriculum-based measurements (CBM) to monitor my students' reading progress throughout the academic year.	1	2	3	4	5
3. I believe graphing data can objectively and accurately inform my instructional decisions.	1	2	3	4	5
4. I can easily make my own line graph in Microsoft Excel.	1	2	3	4	5
5. I know how to describe the relationship between an Aim (goal) Line and the Trend Line on a graph to determine if a student is making progress.	1	2	3	4	5
6. I believe using data to drive my instructional decisions is important.	1	2	3	4	5
7. I believe that using data to drive instruction is too time consuming.	1	2	3	4	5

8. As a teacher I know when a child is ready to move on to a new skill or needs remediation, I do not need to collect ongoing data.	1	2	3	4	5
9. Collecting data takes away too much time away from instruction.	1	2	3	4	5

Appendix 2

Post-Questionnaire

<u>Survey Questions</u>

Please complete each item by circling one of the following:
Strongly Disagree = SD; Disagree = D; Strongly; Neutral = U; Agree = A; Agree = SA;

	SD	D	N	A	SA
1. I know how to collect, graph, and analyze formative data.	1	2	3	4	5
2. I understand how to use curriculum-based measurements (CBM) to monitor my students' reading progress throughout the academic year.	1	2	3	4	5
3. I believe graphing data can objectively and accurately inform my instructional decisions.	1	2	3	4	5
4. I can easily make my own line graph in Microsoft Excel.	1	2	3	4	5
5. I know how to describe the relationship between an Aim (goal) Line and the Trend Line on a graph to determine if a student is making progress.	1	2	3	4	5
6. I believe using data to drive my instructional decisions is important.	1	2	3	4	5
7. I believe that using data to drive instruction is too time consuming.	1	2	3	4	5
8. As a teacher I know when a child is ready to move on to a new skill or needs remediation, I do not need to collect ongoing data.	1	2	3	4	5
9. Collecting data takes away too much time away from instruction.	1	2	3	4	5

Strongly Disagree = SD; Disagree = D; Strongly; Neutral = U; Agree = A; Agree = SA;

Rate the effectiveness of this training:	**SD**	**D**	**N**	**A**	**SA**
This training was useful.	1	2	3	4	5
I learned a lot from this training.	1	2	3	4	5
I will use data in my classroom.	1	2	3	4	5
I would recommend this training to other teachers.	1	2	3	4	5

Thank you for your time and participation.

Appendix 3

Consent for Participation

I understand that by filling out the attached survey(s), I am consenting to participate in research conducted by a doctorate of education student in the Instruction and Curriculum Leadership Department at the University of Memphis. It has been explained to me that all of the information will be kept confidential within the limits allowed by law.

Appendix 4

In-Service Presentation Outline

I. Title: Using Data to Drive Instructional Decisions

II. Presentation Objectives

   a. Answering your questions about data & instructional decision-making…

      i. What are Data?

         1. Data results from measurement.

            The information is organized for analysis.

            It is used to reason and make decisions.

      ii. What is Curriculum-Based Measurement (defined, examples, & what the research says about usefulness in education)?

      iii. Why graph data?

      iv. How do I make a graph using Microsoft Excel (Examples & ChartDog)?

      v. How do I use data to drive instruction (interpreting your graph)?

III. Data results from measurement.

   a. The information is organized for analysis.

   b. It is used to reason and make decisions.

      i. Data Defined: Summative

   c. *Summative data* is static information that provides a fixed ‘snapshot’ of the student’s academic performance or behaviors at a particular point in time. School records are one source of data that is often summative in nature—frequently referred to as archival data.

i. Attendance data and office disciplinary referrals are two examples of archival records, data that is routinely collected on all students.

IV. Data Defined: Formative

a. *Formative assessment measures* are those that can be administered or collected frequently—for example, on a weekly or even daily basis.

b. These measures provide a flow of regularly updated information (progress monitoring) about the student's progress in the identified area(s) of academic concern.

V. Formative data provide a 'moving picture' of the student; the data unfold through time to tell the story of that student's response to various classroom instructional.

a. Examples of measures that provide formative data are Curriculum-Based Measurement probes in oral reading fluency.

VI. Curriculum-Based <u>Measurement</u>

a. For those who may not be familiar with curriculum-based measurement (CBM), it is a system for on-going monitoring of students' progress through a curriculum. It reflects the success of student's instructional programs.

i. If the instructional programs are working well, CBM measures will show that students are making progress.

ii. If the programs are NOT working well, the measures will show little or no gain over time.

VII. Curriculum-Based Assessments

a. Curriculum-based assessment is a broader term than CBM. CBM meets the three curriculum-based assessment requirements:

i. (a) measurement materials are aligned with the school's curriculum;

ii. (b) measurement is frequent; and

iii. (c) assessment information is used to formulate instructional decisions.

VIII. Curriculum-based assessment is a broader term than CBM. CBM meets the three curriculum-based assessment requirements:

a. measurement materials are aligned with the school's curriculum;

b. measurement is frequent; and

c. assessment information is used to formulate instructional decisions.

IX. Curriculum-Based Measurement

a. CBMs, which are often called "probes," are brief and scored objectively.

b. Advantage - because they can be administered quickly, it is possible to assess students' performance frequently.

c. The early research on CBM focused on the development and use of measures at the elementary-school level in basic skill areas such as reading, written expression, and mathematics.

    i. When plotted on a graph, the results provide an easy-to-interpret way of determining whether students are making progress

X. The Basics of CBM

a. CBM is used to monitor student progress across the entire school year. Students are given standardized reading probes at regular intervals (weekly, bi-weekly, monthly) to produce accurate and meaningful results that teachers can use to quantify short- and long-term student gains toward end-of-year goals.

b. With CBM, teachers <u>establish long-term (i.e., end-of-year) goals</u> indicating the level of proficiency students will demonstrate by the end of the school year.

c. The probes are administered the same way every time. Each probe is a different test, but the probes assess the same skills at the same difficulty level.

d. The reading probes have been prepared by researchers or test developers to represent curriculum passages and to be of <u>equivalent difficulty from passage to passage</u> within each grade level.

Probes are scored for reading accuracy and speed, and student scores are graphed for teachers to consider when making decisions about the instructional programs and teaching methods for each student in the class.

e. Using CBM, teachers determine quickly whether an educational intervention is helping a student.

XI. CBM Research

a. Research has demonstrated that when teachers use CBM to inform their instructional decision making, students learn more, teacher decision making improves, and students are more aware of their own performance.
b. CBM research, conducted over the past 30 years, has also shown CBM to be reliable and valid.
c. Intervention Central & CBM Warehouse http://www.interventioncentral.com

XII. How to Administer and Score Reading CBM

a. With Reading CBM, students read letters, isolated words, or passages within a 1-minute time span (fast and efficient). The student has a “student copy” of the reading probe, and the teacher has an “examiner copy” of the same probe.
b. The student reads out loud for 1 minute while the teacher marks student errors.

c. The teacher calculates the number of letters or words read correctly and graphs this score on a student graph. The CBM score is a general overall indicator of the student's reading competency.

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d. In reading, the following CBM tasks are available at these grade levels.

i. Letter Sound Fluency (Kindergarten)

ii. Phoneme Segmentation Fluency (Kindergarten)

iii. Word Identification Fluency (Grade 1)

iv. Passage Reading Fluency (Grades 1-8)

v. Maze Fluency (Grades 1-6)

XIV. CBM Passage Reading Fluency: Grades 1-8

a. CBM for Passage Reading Fluency (PRF) is administered individually. In general and special education classrooms, students take one PRF test each week.

b. For higher-performing general education students, teachers might administer PRF tests (also referred to as "probes") on a monthly basis and

c. In all cases, each student reads three probes on each occasion (<u>the entire administration takes only 3 minutes</u>).

XV. CBM Passage Reading Fluency: Grades 1-8

a. For each CBM PRF reading probe, the student reads from a "student copy" that contains a grade-appropriate reading passage.

b. The examiner scores the student on an "examiner copy." The examiner copy contains the same reading passage but has a cumulative count of the number of words for each line along the right side of the page.

c. The numbers on the teacher copy allow for quick calculation of the total number of words a student reads in 1 minute.

XVI. CBM Passage Reading Fluency: Grades 1-8

a. Administration of CBM PRF is as follows:

i. *Examiner (Reader Please): "I want you to read this story to me. You'll have 1 minute to read. When I say 'begin,' start reading aloud at the top of the page. Do your best reading. If you have* *trouble with a word, I'll tell it to you. Do you have any questions?"*

ii. Begin. Trigger the timer for 1 minute.

XVII. CBM Passage Reading Fluency: Grades 1-8

a. The examiner marks each student error with a slash (/).

b. At the end of 1 minute, the last word read is marked with a bracket (]).

c. If a student skips an entire line of a reading passage, a straight line is drawn through the skipped line.

d. When scoring CBM probes, the teacher identifies the count for the last word read in 1 minute and the total number of errors.

e. The teacher then subtracts errors from the total number of words to calculate the student score.

XVIII. CBM Passage Reading Fluency: Scoring Example

a. Looking at the previous sample CBM PRF probe.

i. Reggie made 8 errors while reading the passage for 1 minute. The straight line drawn through the 4^{th} line shows that he also skipped an entire line. The last word he read was "and" and a bracket was drawn after this word.

ii. In all Reggie attempted 136 words. He skipped 15 words in the 4^{th} line. 14 of those skipped words are subtracted from the total words attempted (136 – 14 = 122) and 1 of those skipped words is counted as an error. Reggie made 8 additional errors for a total of 9 errors.

iii. The 9 errors are subtracted from the 122 words attempted. 122 – 9 = 113**.** 113 is Reggie's reading score for this probe.

XIX. Why Graph Data?

a. Presents raw data in easy-to-read, visual format that allows for data to be analyzed

b. helps the teacher make objective, accurate decisions about teaching strategies (e.g., when to continue or change a procedure)

c. When data are charted rather than simply recorded, achievement improves approximately .5 of a standard deviation.

XX. Purposes of graphing

a. graphs summarize data in a manner that leads to daily decision making

b. graphs communicate intervention effects

c. graphs provide feedback and reinforcement to the teacher and learner

XXI. Graphing Formats: Line Graph

a. Line graph: uses a line to display data

b. horizontal axis is the x-axis, used to record the time (i.e. days, sessions, daily sessions)

c. vertical axis is the y-axis, used to record the performance (e.g., number correct, percentage correct, rate)

d. plot data points along the x & y axis and connect each data point

XXII. Making a Line Graph with Microsoft Excel

a. Click on the cell or box to type in it

b. Columns represent time, rows represent student(s) performance

c. Highlight the entire table

d. Click the chart wizard button

e. Under chart types, click line, then click next

f. A preview will be displayed, click next

g. Let's Practice Making a Graph

XXIII. Graph with Microsoft Excel

a. Type in a chart title (include the student's name, independent variable--instructional strategy--, and target behavior), then click next

b. Click finish. To move the graph, click on the graph and drag it to the desired location. To print only the graph, click on the graph and print.

XXIV. Example: Recording Form and Graph

	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8	Session 9	Session 10
Number of Correct Words per Minute	5	7	8	10	8	7	9	8	9	10

XXV. Academic performance (progress) monitoring through graphing

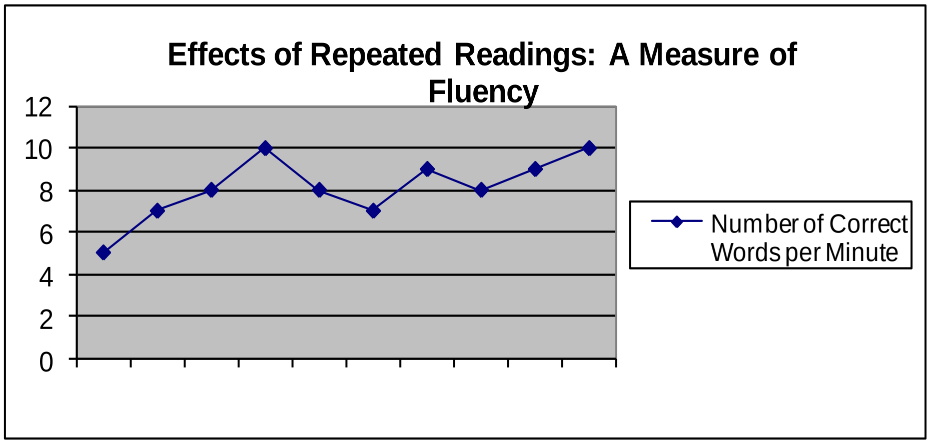
a. In addition to typical line graph, include

b. Aim (goal) line (rate of improvement needed to meet the goal during a given time period. Start line at the baseline median (middle) and proceeds to the goal criterion at the last session of instruction/intervention) (i.e. end of year)

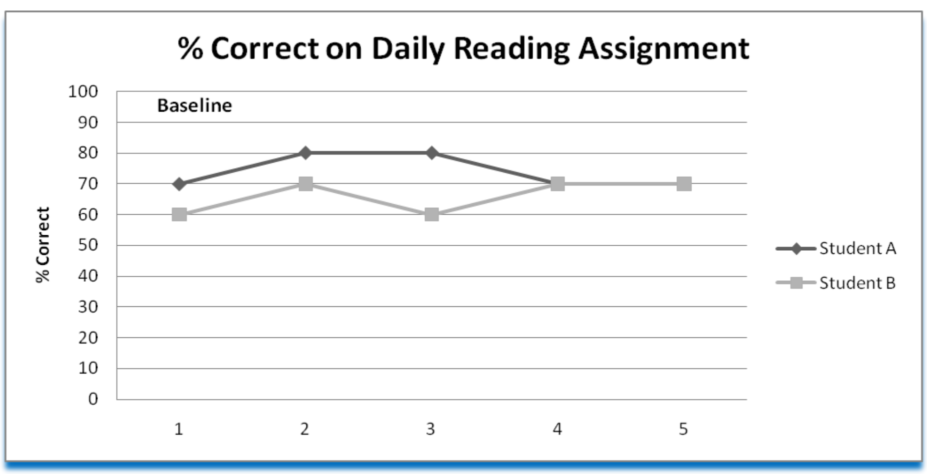
c. Trend line (an estimate of student's rate of improvement represented by a line overlaying student's actual performance or progress)

   i. Student's actual performance - This is the data you entered in Microsoft Excel

XXVI. Example 1: Graph with Aim Line, Trend Line, and Student Performance



XXVII. Example 2: Graph with Aim Line, Trend Line, and Student Performance



XXVIII. Why is graphing CBM Data SO Important?

a. These graphs give teachers a straightforward way of reviewing a student's progress, monitoring the appropriateness of the student's goals, judging the adequacy of the student's progress, and comparing and contrasting successful and unsuccessful instructional aspects of the student's program.

XXIX. Why is graphing CBM Data SO Important?

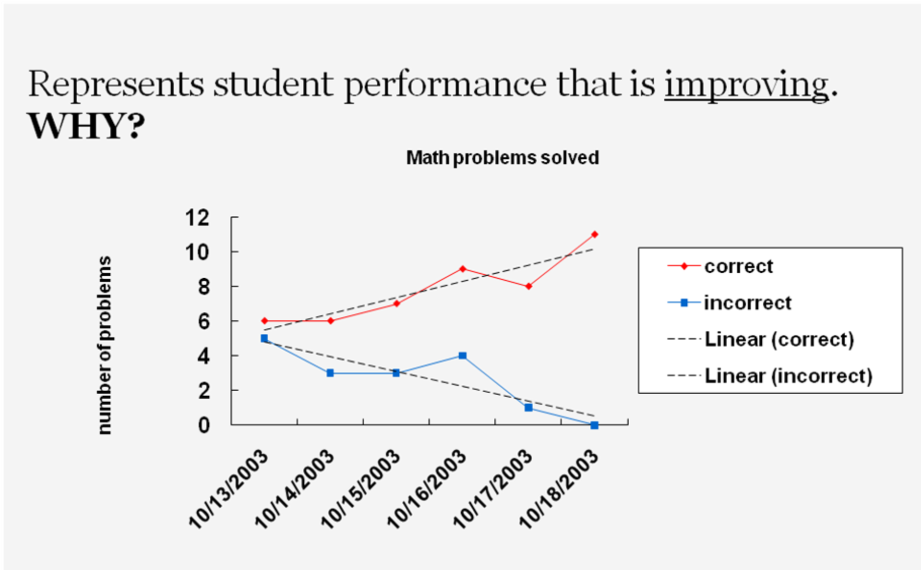
a. CBM graphs help teachers make decisions about the short- and long-term progress of each student.
b. Frequently, teachers underestimate the rate at which students can improve (especially in special education classrooms), and the CBM graphs help teachers set ambitious, but realistic, goals.

XXX. Why is graphing CBM Data SO Important?

a. Without graphs and decision rules for analyzing the graphs, teachers often stick with low goals. By using a CBM graph, teachers can use a set of standards to create more ambitious student goals and help better student achievement.
b. Also, CBM graphs provide teachers with actual data to help them revise and improve a student's instructional program.

XXXI. Interpreting the Data

a. How to read a histogram to determine modifications to instruction.



XXXII. Keep in mind when making instructional changes…

a. Make it a rule to change only one thing at a time so you can be sure of the results of the change

b. Keep the conditions the same for at least 3 days/sessions before making a change. Give it some time!

XXXIII. Something to remember…

a. *"The ultimate goal of assessment is to identify problems with instruction and to lead to instructional modifications... The only way to determine the effectiveness of instruction is to collect data." (Ysseldyke & Algozzine, 1995, p. 198)*

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