Using Data to Inform Instructional Practice

An Action Research Project Presented
In Partial Fulfillment of the Requirements for the
Master of Education in
Early Childhood Education

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April 30, 2011

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Abstract

The purpose of this study was to inform instruction by using data as a progress-monitoring tool to drive instruction and ultimately student achievement. During the course of this study, data was gathered from a pre-test in a mathematics measurement unit to determine differentiated instruction and grouping. Formative short frequent assessments were applied to monitor the learning progress of all students in a fourth grade inclusion classroom. Data was used to change instructional strategies, grouping, and teaching methods to ensure learning success on the unit post-test, and ultimately on end of the year testing. Results demonstrated that by incorporating methods of research-based instruction and implementing short frequent assessments, teachers could begin to bridge the gap in achievement for all learners. Monitoring student progress throughout the school year can inform teachers of the individual learning needs of their students. Teachers can use the data to measure the learning strengths and weaknesses, so that student performance can be analyzed and evaluated. The gap in achievement can be overcome using the implementation of targeted strategies and research-based interventions for all students.

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Introduction

Learning success must be measured by the achievement of all students, including students with disabilities. Using instructional strategies that are research-based can help to close the achievement gap in struggling learners (Walpole, Justice, & Invernizzi, 2004). By incorporating methods of instruction that have been proven effective in increasing student learning, teachers can begin to bridge the gap in achievement. Monitoring student progress throughout the school year can inform teachers of the individual learning needs of their students. This monitoring can be used as data to measure the student's progress, as well as, to allow teachers to evaluate their instructional choices (McGlinchey & Hixson, 2004).

The accountability pressures on schools and teachers across the country from the No Child Left Behind Act of 2001 have forced the conversation on whether using student data can transform teaching practices (Jacobs, Gregory, Hoppey, & Hoppey, 2009). Standardized testing has become the benchmark for student achievement as schools drive towards making Adequate Yearly Progress (AYP). In response to these accountability pressures, school districts are building Data-Driven Instructional Systems (DDIS) that provide the collection and analyzing of data, alignment with state standards, and the construction of programs that are proven to increase student performance (Halverson, Grigg, Prichett, & Thomas, 2007). These efforts strive to increase both student learning and performance.

The State of Georgia responded to the No Child Left Behind Act of 2001 by providing a state mandated Criterion Referenced Competency Test (CRCT) to evaluate mastery of the Georgia Performance Standards (Georgia Performance Standards, 2010). A school district in Georgia provides benchmark assessments that are also criterion referenced and provide performance information for each student by standard. These District Benchmark Assessments (DBAs) provide feedback for instructional decisions, and can help predict

future student performance on the CRCT. This data is used to inform instruction, provide needs-based instruction to individual students, and evaluate present programs and curriculum.

Performance Matters, a formative assessment system that provides teachers and educational leaders with assessment data by standard on both the district and state assessments, provides the software to access student progress (Performance Matters, 2010). Teachers utilize the data to measure strengths and weaknesses, so that student performance can be analyzed and evaluated.

One school in a Georgia County implemented a data feedback system that provides teachers with information for both formative and summative assessments. Teachers build summative testing that covers a unit that is taught. This unit covers multiple standards. Students are pre-tested before they are exposed the material to measure prior knowledge, and develop a baseline. After evaluating the pre-test, teachers differentiate instruction based on the results of the assessment. During the course of the unit, students are tested weekly to appraise mastery over the material taught. These short, frequent assessments are formative, and measure the learning progress of the students. Using these assessments to inform instruction, teachers create flexible grouping, and change instructional strategies and interventions to meet the learning needs of all students (Volante, 2010). Clearly the goal of teaching is to maximize learning for all students, and this is possible by using continuous forms of data collection to positively influence student growth and performance on a unit test. My goal is that measurable growth on a post-test in measurement will translate into achievement on the CRCT (Georgia Department of Education, 2010). My objective during this study was to observe measurable growth in all learners by using data to drive my instruction.

Statement of the Research Problem

During the course of this study, I investigated whether instructional decisions based on both summative and formative assessment data would result in achievement for all students. The focus of this study was to determine if short, frequent assessments could be used as a progress monitoring tool to respond to the learning needs of all students throughout the course of a measurement unit in mathematics. Progress monitoring served as the intervention to measure the growth from pre-test to post-test in this fourth grade inclusion classroom. In this time of high stakes testing and accountability, it is necessary to ensure that teaching and testing are aligned to the curriculum being taught, and that student growth can be monitored. The theory is that when teachers use data to drive instruction we can identify what standards need to be re-taught for mastery. Progress monitoring allows the tracking of individual performance, and creates a focus on the individual needs of each child. When children receive instruction that targets their learning needs, they are able to master the standards. Mastery predicts future performance on unit testing, as well as, standardized testing (Blanc, Christman, Lui, Mitchell, Travers, & Bulkley, 2010).

Definitions of Terms

Adequate Yearly Progress- This term explains whether or not a school has met yearly state math and reading goals as a provision in No Child Left Behind legislation (No Child Left Behind Act of 2001).

Criterion Referenced Competency (CRCT) –A state mandated criterion referenced assessment based on Georgia Performance Standards, and evaluates the strengths and weaknesses of each child in first through eighth grade (Georgia Department of Education, 2010).

Data Driven Instructional Systems- Design created within schools to allow the flow of informational data on student learning to be used to increase student achievement (Halverson, et al., 2007).

District Benchmark Assessments (DBA) – Formative assessments that provide teachers with a leading indicator to provide needs-based instruction. The evidence of this data is provided by *Performance Matters* (Performance Matters, 2010). DBAs are considered interim assessments.

Formative Assessments – Assessments that are used as part of the ongoing instructional process. Formative Assessments are simply check points in the learning process to inform instruction, grouping, intervention, or enrichment strategies. Common assessments or short, frequent assessments (SFAs) are examples of formative assessments (Bulkley, Christman, Goertz, & Lawrence, 2010).

Georgia Performance Standards (GPS) -Curriculum goals and expectations that provide guidelines for instruction, learning, and assessment in Georgia schools based on national standards and research-based practices (Georgia Performance Standards, 2010).

Georgia Online Assessment System (OAS) – A site that provides test practice for students based on the Georgia Performance Standards, and a test bank of questions for administrators and teachers that are based on the same type of questions that students will encounter on the DBAs and the CRCT. The questions from the DBAs are chosen from the OAS site by Paulding County. These bank questions are not released as practice, and some are actually questions from previous CRCT testing (Georgia Online Assessment System, 2010).

Summative Assessments- Assessments that are given to test for mastery of the learning goals and standards (Georgia Performance Standards, 2010). Examples of this assessment are the CRCT, DBAs, and pre- and post-tests.

Title 1- Funding from the Federal government to bridge the achievement gap in those students who are either at risk or low income as stated in the NCLB (No Child Left Behind Act of 2001).

Assumptions of the Researcher

Given a safe learning environment and instruction that is based on the individual needs of each student, I believe that all children can learn. Because of this belief, any gap in achievement with the implementation of targeted strategies and interventions can be overcome, and this includes students with disabilities or students that are economically-disadvantaged. It is assumed that student growth on the unit post-test in this study will translate to growth on the District Benchmark Assessments and the CRCT.

Limitations of the Research

As a teacher in a public school taking this course, I was limited by my available time to conduct this research. I was also limited to the number of students that returned their permission slips from their parents as consent to be involved. The results from this research may not be generalized, that is they may not apply to other classrooms.

Summary

This study used data from a pre-test in a measurement unit to determine differentiated instruction and grouping, and then used formative short, frequent assessments (SFAs) to monitor the learning progress of all students in this fourth grade inclusion classroom. Data was used to change instructional strategies, grouping, and teaching methods to ensure learning success on the unit post-test, and ultimately on the District Benchmark Assessments (DBAs) and the CRCT. Using formative assessments helped to gauge the level of understanding, as well as, when to know that a particular teaching method or strategy was working and changing when it did not (Bakula, 2010). By continuously monitoring student progress, it was clear when the standards were mastered.

Literature Review

With the passage of the No Child Left Behind Act of 2001, all states have to provide state assessments based on rigorous standards. States and local school districts are held accountable for providing measurable goals for all students in an effort to bridge the gap in achievement especially with low income and minority students. Educational reform has driven the discussion how to use the data from assessments to inform instruction. One argument is that if teachers engage all learners with a rigorous curriculum, monitor their progress, and change instruction as needed, that all students can be successful (Diamond, 2007). When teachers meet the needs of all students, then the achievement gap can be eliminated. Data has become an issue because of testing accountability, and the response to intervention model because of recent legislation. Using this data can provide more focused and precise instruction that is based on the individual needs of each child (Jacobs, et al., 2009).

How Teaching is Affected by Testing Accountability

Certainly, there are cases where students are taught the test by well-intentioned educators in an effort to increase standardized testing scores to meet accountability measures. Additionally, there are teachers that use both formative and summative assessments to collect data on measured growth, and then do not allow that data to inform their instructional practice (Olah, Lawrence, & Riggan, 2010). In many cases, teachers hold the belief that in order to raise test scores they must use the explicit teaching of isolated skills, worksheets, and assessments that are visually similar to standardized multiple choice testing. During a two-year study, teachers found that by using performance-based assessments, collaborative grouping, and authentic writing that their scores on standardized

tests actually increased (Miller, 1995). Please note that each state chooses their own assessments that comply with the federal law, and meet their own state standards.

Many states are beginning to see the value in performance-based assessments that are more relevant and connected to student's lives. According to Parke, Lane, and Stone (2006), in a study in Maryland using the Maryland School Performance Assessment Program (MSPAP) in both reading and writing, there was a significant increase in scores over the five years represented in this study. Performance-based assessments can be effectively used as an alternative method of providing valuable data, and measuring achievement. Testing accountability does not have to translate into teaching to a test (Parke, Lane, and Stone, 2006).

Progress Monitoring to Build Student Achievement

Many local districts are turning to the use of interim district benchmarks to continuously assess students to build data that can be analyzed to target instruction toward standards that are not mastered. According to Bulkley, Christman, Goertz, & Lawrence (2010), a district in Philadelphia used benchmarks to measure growth every six weeks throughout the school year. As a prelude, this case laid the groundwork for understanding how the link between the district and teachers can be a cohesive one, and how collaboration on all levels can improve student learning and performance (Bulkley, et al., 2010). Another excellent tool that measures student learning is curriculum-based measurement (CBM). CBM, which assesses reading fluency, has proven to be reliable and valid, and provides a great way to both collect data and provide a continuous monitoring of student progress (McGlinchey & Hixson, 2004).

Progress monitoring enables teachers to collect constant feedback on the standards already mastered, and identify specific gaps in learning that need to be re-taught. Using this

data, teachers can group students for needs-based instruction so that all students can develop proficiency. Based on a controlled experiment Ysseldyke & Bolt (2010), implemented progress monitoring by administered a pre- and a post-test, and an instructional management system with their math curriculum. In this study the experimental group was assessed frequently, and based on the data, instruction and interventions were changed in response to their performance. The control group simply used the math curriculum. Results showed great gains in standards mastery and post-test scores through this use of data collection. Progress monitoring provides teachers a way to measure what each student needs to learn, and then the ability to ensure that mastery has been obtained.

Building Instructional Communities

Much research has been completed on school systems that can maximize the use of data and translate that knowledge into student achievement. In a study, data was collected from four schools over a period of a year to build a data-driven instructional system (DDIS) that reflected how schools align standards and instruction, as well as, use assessments that provide formative feedback and instructional guidance (Halverson, et al., 2007). This framework also provides rich collaborative communities that collect, analyze, respond, and reflect on data. If teachers are to use data successfully, they must continuously interpret data to drive their instructional decision-making, and translate that data into differentiated instruction. Districts that build successful collaboration experience higher student performance and achievement.

Many local school systems across the country are constructing benchmark assessments that are used to measure student growth, inform teaching practice, and predict future success on state standardized tests. For instance, Bulkley, Christman, Goertz, and Lawrence (2010) determined that success is maximized when school districts build

instructional communities that share data and communicate strategies that work. Constructing communities that provide a system of support and communication must be based on three types of sense making; “strategic, affective, and reflective” (Blanc,et al., 2010, p. 212). It is not enough to simply collect data. This knowledge must be utilized to transform teaching practice, so that the instructional needs of each student are met.

Creating an instructional community includes the professional development of teachers, because they have the greatest impact on student achievement. Professional development provides the necessary knowledge, proficiency, and beliefs to build a community of learners. Hayes and Robnolt (2008) describe how student achievement is affected by using data-driven decision making to inform professional development for their teachers as a result of a federal grant through the Reading Excellence Act. Educators incorporated informal assessments that were already in use for student placement to determine the greatest instructional need for their students. To determine what professional development each grade level needed to best meet the needs of their students, the grant coordinator and staff analyzed the data. Building communities encourages a discussion that allows teachers to seek those instructional strategies and interventions, as well as, professional learning that will enhance both their practice and student achievement (Blanc, et al., 2010).

Data-Driven Instruction That Provides Student Success

Using data to inform instructional practice has transformed many school districts by providing increased student achievement. According to Dappen, Isemhagen, and Anderson (2005), the Nebraska STARS Program is based on local district control and accountability. Testing data produced steady growth for their students. Teachers determined that by being able to make critical judgments in the assessing of their students, they were able to provide a more individualized and targeted instruction that resulted in greater success. In this

program, teachers were afforded the necessary control so that they could respond immediately to the instructional needs of their students, and this translated into higher student achievement.

In three Maryland schools, a survey was completed to determine if there was a relationship between instruction and assessment performance (Guthrie, Schafer, & Secker, 2000). More specifically, educators wanted to identify what those schools that were reliably increasing their reading standardized testing scores were doing that was different. By constructing data that revealed what practices were working to monitor students' growth, they changed their instruction in response to the growth of their students. In this study, some local Maryland schools began using reflection to evaluate students' existing knowledge, build the understanding of their educational experience, and enrich their experience to build new knowledge. Reflection provides constant re-evaluation of instructional methods that allows both teachers and students to change their experience and actively engage in the learning process (Bulkley, et al., 2010).

Many school districts have created more performance-based assessments in response to accountability. One such school district in Pittsburg, Pennsylvania has constructed a Work Sampling System, or WSS (Meisles, Bickel, Nicholson, & Atkins-Burnett, 2001). By implementing this study, they wanted to judge the validity of WSS in kindergarten through third grade in five schools. WSS is based greatly on the effectiveness of teacher judgments using curriculum-embedded performance assessments. Given individually, the WSS correlated with a standardized psycho-educational battery, and determined that in students that were above the first grade teacher judgments based on the WSS were highly correlated.

Clearly the question that needs to be answered about data-driven instruction is whether it can actually close the achievement gap between high achievers and low achievers, especially with low income and minority students. In an urban school district, a quantitative study with 98% minorities and 95% free or reduced lunches located in Southern California raised their test scores by a minimum of 12% (Shanahan, Hyde, Mann, & Manrique, 2005). Changes implemented included; benchmark assessments to inform instruction, curriculum guides that were aligned with state standards, and professional learning. Professional learning included guidance on interpreting data, and learning new strategies to teach math in a concrete, hands-on way. Demonstrating the importance of using data to inform instruction, this study implemented proven researched-based practices that provided results. Using benchmarks assessments for data that are aligned with standards, allowing data to inform teaching practice, and participating in professional development that provides research-based methods can positively affect the achievement gap.

Research Question

In order to effectively use data to increase student achievement, it is important to establish the relationship between data-driven instruction and student achievement. This study determined that there was a positive relationship between data-driven instruction and student achievement, and tested it by measuring the outcomes on a pre- and post- test. Instruction was driven based on the results of the pre-test and the common formative assessments, in a fourth grade inclusion classroom on a measurement unit in mathematics. In response to the data on these assessments instruction, interventions, and grouping were change based on the individual needs of the students. The grade level staff used this data in collaboration to determine research-based strategies, reflect on student knowledge, and make judgments on assessment results.

The literature review provided studies that have been used to transform districts and schools by effectively using data to drive the instructional decision-making of teachers. This study used data-driven instruction to increase student performance from a pre-test to a post-test using short frequent assessments as a measure of student understanding, and a guide to daily instruction. This study was conducted to determine if there was a relationship between data-driven instruction and student achievement using the methods of the studies provided in the literature review as a guide.

Research Method

Overview of the Project

Recently, there has been a great push to use data gathered in the process of accountability to Federal standards (Silberglitt, Burns, Madyun, & Lail, 2006). This study was conducted at an elementary school within the greater Atlanta metropolitan area, and is located in a suburban area in northwest Georgia. The school is a Title 1 school that made Adequate Yearly Progress (AYP), and has been in operation for only two years. The study was conducted in a fourth grade inclusion classroom, and five of the eighteen students that returned their permission slips are served with special education services with an Individual Education Plan (IEP). The school population that is Economically-Disadvantaged is 39%, and within this group it is 50%. The African-American population for the school is 15%, and within this study it is 16%. The percentage of Hispanic and Multi-racial population in the school is 4%, and in this study it is 11%.

Georgia Performance Standards (GPS) are the curriculum that students are tested on in response to the NCLB Act of 2001 (Georgia Performance Standards, 2010). This legislation was enacted to ensure that every child has a right to achieve mastery with grade level standards and state assessments. Measuring this proficiency is the Criterion Referenced Competency Test (CRCT) that is aligned with these standards. This assessment is used to determine strengths and weaknesses in math, reading, language arts, science, and social studies. District Benchmark Assessments (DBAs) in this county are administered as interim measurements in the fall and winter of each school year. These assessments are diagnostic, and are used to determine instructional needs and to prepare for the CRCT. Both the state and county testing data is available by standard on *Performance Matters*, 2010. This data is available to teachers to target instruction based on standards that are not mastered, and teachers do this by using research-based instructional strategies and

interventions based on the needs of the individual child. Within the classroom, teachers construct both formative and summative tests that are also based on GPS. Students received pre-testing to provide a baseline for their knowledge in the beginning of a unit. Academic gains are monitored through the use of short, frequent assessments (SFAs) that measure their level of understanding. The results of the pre-test and the SFAs inform instruction, allow grouping of students based on their instructional needs, and monitor student progress (Roehrig Duggar, Moats, Glover, & Mincey, 2008).

Hypothesis and the Null

In order to effectively use this data, it is important to establish the relationship between data-driven instruction and student achievement. For the purpose of this study, instruction was driven based on the results of the pre-test and the short, frequent assessments in a fourth grade inclusion classroom on a measurement unit in mathematics. So, this study was conducted to determine if there was a significant increase in student achievement when data-driven instruction was used for a unit in measurement. If no growth or correlation is present in the findings of this study, it is reasonable to state that there is no significant relationship between data-driven instruction and student achievement.

Description of the Sample

The sample that was collected for this study was a convenience sample in an inclusion classroom where eight of the twenty-five students have a learning disability. Within this classroom, there are also two students served in the Title 1 Program. Of the students that returned their permission slips there are 10 females and 8 males (n=18). One student is served in a gifted program called Venture. This group consisted of 13 White students, 3 Black students, 1 Hispanic student, and 1 Multi-racial student. In this study, there are nine students that receive free or reduced breakfast and lunch. I gained permission or informed consent from all of the parents of these students. There were no risks, physically or

mentally, from the implementation of this study. The identities of the students and their scores have been protected, and they are referred to by a number.

Data Collection/Instrumentation

This unit of measurement spanned a period of four weeks. Four short, frequent assessments were given approximately once a week to monitor progress and understanding. These assessments were used to re-group and re-teach concepts not mastered. Those students that demonstrated mastery were given extension activities to enrich their knowledge of measurement. The research in this study is quantitative because data was collected to determine if the findings had a positive relationship with student achievement. Data from the pre- and post- unit test on measurement was collected, and the instrument used was a paired correlated t-Test (Lowery, 2008). This instrument was used to compare the two means from the pre- and the post-test to measure the growth of learning, as well as, to determine if there was evidence to reject the null hypothesis.

Design

This quasi-experimental design measured the effectiveness of the intervention based on the growth from the pre-test to the post-test. Students were given the pre-test at the beginning of the study of measurement in mathematics, and then at the completion of the unit they completed the post-test. The unit tests are summative, and were gathered in part from the Georgia Online Assessment System, as well as, teacher created questions. Progress monitoring was the intervention used in this study to determine the growth by using short, frequent assessments.

These formative assessments were used to continuously monitor the progress of students, and the results were also used to change instructional strategies, utilize flexible grouping, and to ensure that the individual learning needs of all students were met. These common assessments were simple performance tests that required very little writing, and were used just to get an idea of whether the student could master that portion of the

standard (Parke, et al., 2005). SFAs were teacher-created to gauge the effectiveness of the instruction, as well as, to assess the individual needs of each student for remediation, re-teaching, or enrichment.

Procedures

Data was collected from the short, frequent assessments, as well as, the pre- and post-test over a four week period. The students' prior knowledge was measured by a pre-test, and the short, frequent assessments were used to monitor the understanding of the standards as they were taught. The summative pre- and post-test were the same, and measured the mastery of the standards in measurement. As the SFA's were given, students were re-taught the material using various interventions, and grouping to build understanding. An example of an intervention was the use of manipulatives to build connections and real world experience, as well as, to teach to different learning styles and multiple intelligences in an effort to teach to the strengths of all learners.

Method of Data Analysis

Data was organized by listing each participant as only a number, and then listing the results of the short, frequent assessments, the pre-test and the post-test (see Appendix A). After the data was collected, I performed a paired t-Test (see Appendix B) (Lowery, 2008). This test compared the means of my pre-test and post-test. The validity and reliability of a portion of my test questions has been established over the past eight years by the District Benchmark Assessments that have been administered in my county. Since the test questions for both the District Benchmark Assessments and the unit tests come from the same bank, I can extend that reliability and validity to a portion of the questions on my unit tests.

Results and Conclusions

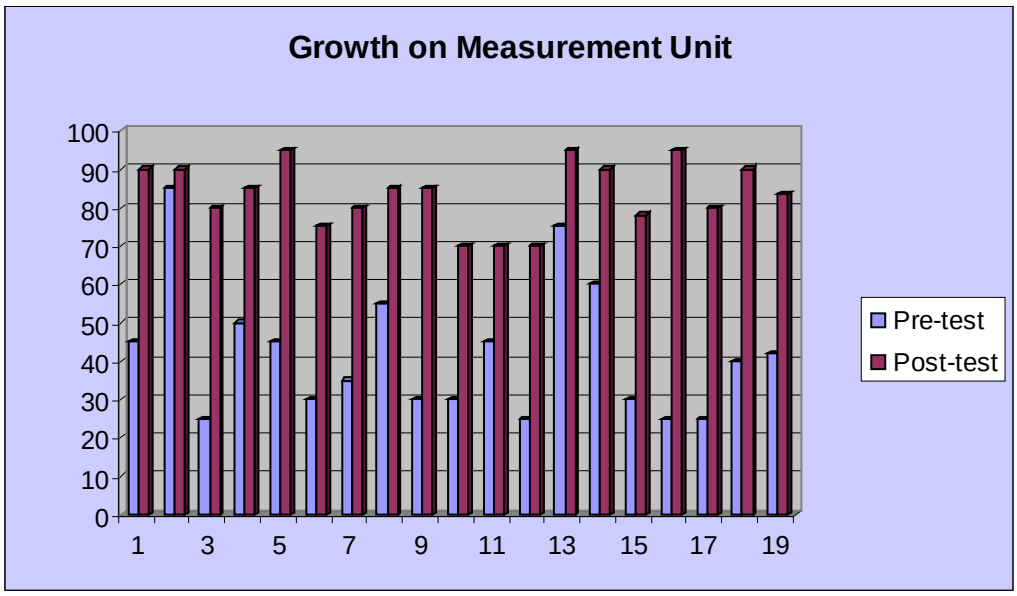
This study examines the relationship between data-driven instruction and student achievement. Students were given a pre-test to determine prior knowledge, and then a series of short, frequent assessments after each skill was taught to determine understanding (Halverson, et al., 2006). The students were then re-taught the skill using various instructional interventions and grouping strategies (Guthrie, Schafer, & Secker, 2000). The short, frequent assessments were used as a progress monitoring tool, and for feedback on what individual students needed to be re-taught. Instruction was fluid in that it varied with the needs of the students, and the data served as the catalyst for change. The data shows that all students passed the post-test, and all demonstrated growth from the pre-test to the post-test. The mean of the correct score on the pre-test was approximately 42%, and the mean on the post-test was 83.5%. The growth illustrated in the table below shows that the students, as a group, nearly doubled their score from pre-test to post-test. The average growth was approximately 42% (see Table 1). Although all students demonstrated growth, 67% progressed by 40% or better. This growth is illustrated in Figure 1. The category is the student's assigned number, and the value is the score the student received on the pre- and post-tests.

Table 1

Results of the Summative Testing

Student Number	Pre-test	Post-test	Difference
1	45	90	45
2	85	90	5
3	25	80	55
4	50	85	35
5	45	95	50
6	30	75	45
7	35	80	45
8	55	85	30
9	30	85	55
10	30	70	40
11	45	70	25
12	25	70	45
13	75	95	20
14	60	90	30
15	30	78	48
16	25	95	70
17	25	80	55
18	40	90	50
	41.94444444	83.5	41.55555556

Figure 1



Results

Table 1 compares the difference between the two observations, the pre- and post-test. Using the One-tailed interpretation, since $p < .05$ and $t > 0$, there is an increase ($t=8.97$, $df=34$, $p=<.0001$) (Lowery, 2008). There was a statistically significant increase in student performance in the fourth grade inclusion classroom during this measurement unit. Using the Two-tailed t-Test, since $p < .05$ and $t > 0$, there is evidence that there is a significant difference across the paired observations (Lowery, 2008). There is evidence to reject the null hypothesis that states that if no growth or correlation is present in the findings, than it is reasonable to state that there is no significant relationship between data driven instruction and student achievement.

Conclusions

During the course of this study on measurement, data was used to evaluate the choice of instructional methods based on the prior knowledge, learning styles, and multiple intelligences of each individual child. Because the school in this study is in a rural area of Georgia, it was consistently noted that many students lacked background experience in measurement.

The first skill within the standard of measurement was weight conversion (Georgia Performance Standards, 2010). Many students had no experience with weight and mass. As a class, we weighed paper clips, pencils, fruit, and books to build prior knowledge. Students were supposed to convert grams to kilograms, ounces to pounds, pounds to tons, as well as, the inverse of these. One great difficulty was differentiating between grams and ounces. Students are required to be able to pick out real world examples of each. For this reason, we used examples in all conversions to build the necessary connections. For example, when we worked with grams, we connected grams to the mass of paper clips, and ounces to the weight of an apple. By using both visual and concrete examples in our discussions, we constructed both conceptual and procedural knowledge. By connecting both real world examples and experience, most students did well on this abstract skill. (Appendix A).

During the teaching of rotation, students used their bodies to perform the rotations of 90º, 180º, and 360º. They were also able to use objects, as well as, letters on their paper to demonstrate their understanding in ways that covered all learning styles. The success of using different instructional strategies was demonstrated in the results of the second short, frequent assessment. All students in the class that participated in this study made 100% (Appendix A).

Measuring angles using protractors proved to be the hardest concept that students had to master in this unit. One third of the students did not pass the short, frequent assessment, but on the unit post-test all students were successful (Appendix A). By using performance-based activities like modeling the angles with folded paper helped them visually, and provided the students with a concrete example. As a grade level, we discovered that building conceptual knowledge needed to begin with concrete hands-on activities and modeling. After the data was reviewed from the third SFA, those students who did not pass were given more instruction and practice. The re-teaching of this skill was successful based on the results of the post test.

Students also needed to know that the sum of all angles is 180º. So, they had to determine the measurement of an unknown angle with only knowing the measure of the other two angles within a given triangle. Students had to engage in a two-step process by adding the two known angles, and subtracting that sum from 180º. Because the process involved two steps, as well as two different operations, it was a difficult concept to master for many students. As a class, we started off with multiples of ten making it easy for students to add and subtract before they were challenged. Students were given extensive practice before the SFA was given to provide small successes to build confidence and mastery. All students passed this short, frequent assessment (Figure A).

Discussion

Many times teachers will gauge the understanding of their students by classroom discussion and the completion of worksheets only to discover on summative testing that the students actually did not demonstrate mastery. Using common formative assessments provides continuous feedback on the progress of learning (Bakula, 2010). It is simply not enough to collect data. Without interpreting the results of data instruction, performance will remain unchanged. Teachers must use data to reflect, change, and build their practice to

meet the needs of their students. This feedback is used to gauge student understanding, and then re-teach to mastery. In this study the results demonstrate that if teachers engage all learners with a rigorous curriculum, monitor their progress, and change instruction as needed, all students can be successful (Diamond, 2007).

The results in this study include 33% students with disabilities population, and 50% of the students were economically-disadvantaged. Both of these numbers are considerably higher than the school's collective population. It is interesting to note that within the presentation of the scores no sub groups, or achievement gap can be identified. The findings of this study certainly support the theory that using researched-based practices, progress monitoring, and reflective practice can make a difference in all learners especially those struggling students (Walpole, et al., 2004).

Monitoring the progress of all students enables teachers to tailor instruction cognizant of all students (Jacobs, et al., 2009). For the purposes of this study, summative testing was used in the form of a unit test. The pre- and post-unit tests were the same, and this created a prior knowledge baseline, so that growth could be measured with the post-test. The learning progress of the students was built by using short, frequent assessments to gauge mastery of the standard taught. At this point, instruction and grouping changed to meet the needs of those students still struggling. The scores from the short, frequent assessments were not counted, because they were for diagnostic and instructional purposes only. A few students did not pass a SFA, but they recovered the knowledge as evidenced by their post-test scores. This recovery was made possible by re-teaching the standards. Students were grouped according to need, so that mastery could be achieved on the post-test. Data was used to differentiate instruction, and was predictive for end of the year testing, as well as, district goals (Blanc, et al., 2010).

Data was collected not only to evaluate student learning, but also to reflect on the research-based practices that were successful. Instructional strategies that did not work

were replaced. For example, the strategy of guessing and checking were used to determine the sum of all of the angles in a given triangle. The students were given two angles and had to find the third based on the knowledge that the sum of all angles in a triangle is equal to 180º. The process of this strategy did help to build conceptual knowledge, but did not prove to be a helpful strategy, especially when the numbers were odd. Student progress was discussed to share different strategies and interventions to develop and deliver instruction that would ensure student mastery. Based on this collaboration, a new strategy using the addition of the two known angles and then subtracting that sum from 180º was used. As fourth grade teachers, we discovered that students found this strategy easier. Using reflective practice transforms teachers into instructional leaders (Halverson, et al., 2007). Reflection provides the necessary re-evaluation of teaching practice to enhance the engagement and learning of all students.

Limitations

The limitations of this study were time, limited participation, and generalization. The teaching of this unit in measurement was limited to a four week study, because all standards must be taught before the administering the CRCT in April. Another limitation was the number of students that returned their permission slips with the written consent of their parents. Finally, this study is limited to the parameters of this individual classroom. The results from this study may not be generalized to other classrooms without the same demographic composition and standards. The short, frequent assessments were teacher created with future assessments in mind. The District Benchmarks have not been tested for validity, but have been used reliably for both diagnostic and predictive value for the CRCT. It is not known how these county and state assessments are comparable or relevant with other district or state testing.

Because students knew that they were being observed during this unit in measurement, it is possible that the Hawthorne Effect could be a factor in the internal validity of this study (McMillian, 2008). However, informed consent from both parents and students was completed a month in advance of the actual study. It is not known if the students actually remembered that I was observing them. So, it is unclear if this threat had any effect of the outcome of this study.

Another limitation to this study is the testing accommodations given to the students that are served in special education. Those students make up 33% of the students in this study, and their accommodations included, reading the test questions, testing in a small group, and repeating and paraphrasing the directions.

Implications for Classroom Practice

The implications from this study can be used in schools to build Data-Driven Instructional Systems (DDIS) in an effort to build the knowledge and practice of using data to drive instruction (Halverson, et al., 2007). It is apparent that testing accountability will continue due to NCLB, and that school districts across the country will still feel the pressure of high stakes testing. For this reason, school systems that can gather, analyze, respond, and reflect on data will be successful in building student achievement (Halverson, et al., 2007). This system can be used to select professional learning, evaluate both instruction and curriculum, and as a prognostication for future performance on assessments to bridge the gap in student achievement.

Schools should use data discussions to inform the decisions they make about teacher development (Hayes & Robnolt, 2007). Professional learning that is strategic can build teacher knowledge in areas where data has revealed weaknesses. This will directly impact the instructional needs within the classroom. Teachers that reflect on the data from their students will seek out instructional strategies and interventions that can help change their practice, and districts can support them by providing professional learning that targets the

instructional needs within their county, school, and grade level. This reflection provides the necessary re-evaluation of practice to enhance the engagement and learning of all students (Bulkey, et al., 2010). It makes sense to develop proficient teachers, because they have the greatest impact on the achievement of students.

Using data is a way to evaluate student understanding, assessments, and curriculum. The use of short, frequent assessments as a continuous monitoring process is a great way to ensure that students understand the skills being taught before the unit test is given. By allowing teachers to fill in the gaps of learning, they can proactively target instruction. Using short, frequent assessments enables teachers to reflect and change their practice based on the needs of their students (Bakula, 2010). They can serve as a prelude to those important conversations on whether the curriculum is aligned with standards and testing. Reflecting on the entire learning process can build a better understanding by providing constant feedback, and can lead to better plans for action and change in student achievement.

Accordingly, the bottom line is whether or not data-driven instruction can bridge the achievement gap with struggling learners. In this study, all learners made gains and met the standard, including students with low income and students with disabilities. Simply teaching the standards, and recording grades will not translate into successful learners. Teaching is a practice that must respond to all students, and instruction must be given using different strategies and methods to engage all learners (Shanahan, et al., 2005).

For my students, this unit of math provided a much needed success. Because so many of my students struggle with all domains, using data-driven instruction allowed me to change my instructional strategies and interventions to meet their needs. If a particular method of instruction did not work, the short, frequent assessments informed me. I was able to re-teach all of the skills my students struggled with so that they could be confident and

successful on the post-test. Data-driven instruction informed not only my practice, but also the instructional needs of my students.

Recommendations for Further Research

It is clear that benchmark testing is successful in driving instruction, as well as, predicting future testing performance. However, the research on benchmark assessments is limited. More understanding and research is needed on how often students should be tested. In the literature review of this study, Philadelphia uses interim benchmarks every six weeks to change instruction based on the assessment data (Olah,et al., 2010). These schools actually have a week after the results are realized to re-teach all of the skills that were not mastered. The school district in this study uses fall and winter benchmarks for diagnostic and predictive purposes. Is it any better to use these benchmarks every six weeks instead of twice a year? Would there be any change in student achievement? Would using the benchmarks better predict student success on high stakes standardized testing?

Most teaching is based on skills, and not authentic learning experiences. One study was based on performance-based assessments in Maryland in reading and writing, and has experienced an increase in their scores (Parke, et al., 2006). Another study that was used in my research increased test scores by using performance-based assessments, collaborative grouping, and authentic writing (Miller, 1995). More research needs to be done to determine if performance-based learning experiences and assessments will increase all student achievement. Could this help close the achievement gap for struggling learners?

There has been some research on Data-Driven Instructional Systems (DDIS) that builds a framework of data. DDIS creates a community throughout a district to collect, analyze, respond, and reflect on data (Halverson, et al., 2007). These communities analyze the alignment of the standards, instruction, and assessments. Certainly these discussions are

needed in education if we are truly willing to put our students first. Teaching and learning should be focused on the individual needs of the students. Although more research is needed on this concept, it is clear that teachers should be an active part of the choices that directly affect their students, and their practice.

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Appendix A

Student Achievement on Summative and Formative Assessments

Students	Pre Test Score	SFA # 1 Score	SFA # 2 Score	SFA # 3 Score	SFA # 4 Score	Post-Test Score	Student Growth from pre to post Test
1	45	100	100	55	85	90	+45
2	85	100	100	100	100	90	+5
3	25	100	100	85	100	80	+55
4	50	100	100	40	85	85	+35
5	45	100	100	85	100	95	+50
6	30	80	100	85	85	75	+45
7	35	100	100	55	85	80	+45
8	55	100	100	100	85	85	+30
9	30	100	100	85	100	85	+55
10	30	80	100	55	100	70	+40
11	45	100	100	85	100	70	+30
12	25	100	100	70	85	70	+45
13	75	100	100	100	100	95	+20
14	60	60	100	55	70	90	+30
15	30	60	100	85	100	78	+48
16	25	100	100	40	85	95	+70
17	25	80	100	85	85	80	+55
18	40	80	100	85	70	90	+50

Appendix B

Vassarstats Calculations

Vassarstats

Independent Samples

Independent Samples

Data Entry

Sample A	Sample B
90	45
90	85
80	25
85	50
95	45
75	30
80	35
85	55
85	30
70	30
70	45
70	25
95	75
90	60
78	30

Data Summary

	A	B	Total
n	18	18	36
ΣX	1503	755	2258
ΣX^2	126759	36975	163734
SS	1258.5	5306.944	22107.22
mean	83.5	41.9444	62.7222

$Mean_a$—$Mean_b$	t	df	P		
41.5556	+8.97	34		one-tailed	<.0001
				two-tailed	<.0001

F-Test for the Significance of the Difference between the Variances of the Two Samples$_Q$

df_1	df_2	F	P
17	17	4.22	0.002452

[Applicable only to independent samples.]
P>.05 indicates no significant difference detected between the variances of the two samples.

t-Test Assuming Unequal Sample Variances

[Applicable only to independent samples.]$_Q$

$Mean_a$—$Mean_b$	t	df
41.5556	9.23	24.63

P		
	one-tailed	<.0001
	two-tailed	<.0001

	Observed	Confidence Intervals 0.95	0.99
$Mean_a$	83.5	± 4.2791	± 5.8812
$Mean_b$	41.9444	± 8.7871	± 12.077
$Mean_a$–$Mean_b$ [Assuming equal sample variances.]	41.5556	± 9.403	± 12.6454
$Mean_a$–$Mean_b$ [Assuming unequal sample variances.]	41.5556	± 9.1381	± 12.2892
		Independent	