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Supporting the Struggling Mathematics Student in My Fifth Grade Classroom

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Abstract

Everyday Mathematics is a popular reform and research-based program that is currently being used in my district. It is not a complete math program however, and some struggling students are being left out. This project examines 20 fifth grade girls and boys, ages eleven to twelve year-old students from Waterford, Wisconsin. It asks the question of whether small group and individual instruction with the teacher combined with additional parental information will improve students' attitude toward mathematics and their knowledge. This project provides resources to add to current Everyday Mathematics instruction. Everyday Mathematics unit tests and student surveys were the assessment pieces for this project. While working with small groups and individuals the project did find that students receiving additional support as a group gained more knowledge. Strives were also made in students becoming successful advocates for their own learning.

Chapter One

Introduction

Currently my school district implements the Everyday Mathematics (EM) program. This is a reform and researched-based mathematics program from the University of Chicago. Its first edition was released in 1988, and it is used in all fifty states (The University of Chicago School Mathematics Project, n.d.). Everyday Math is different than other programs widely in use because concepts are not taught isolation, but instead in connection to everyday life through situations and ideas (The University of Chicago School Mathematics Project, n.d). While I like parts of the program, I saw some students have difficultly learning in this format. This is what I believed caused some students to struggle. They were working on trying to understand how concepts related to them and their lives and ended up losing focus on the math concepts that I was attempting to teach them. EM is presented by teaching the whole to the parts, and that works for many students. However I have seen struggling students learn parts to the whole better. They needed things broken into concepts. These students often don't know their multiplication and division facts. It has made it difficult for them to solve problems that deal with complex real-life issues when they haven't had their basic facts mastered. My project addressed these students while still providing them with the Everyday Mathematics program, which has proven to out perform traditional mathematics programs (The ARC Center, n.d., p.5).

I have seen a need to find more support for my struggling students. While the EM program has been proven to raise student test scores, I have seen students who have difficulty making growth with this program (The ARC Center, n.d., p.5). While Everyday Mathematics explains on its website that it is designed to, "…provide opportunities for family members to participate in the students' mathematical learning" (The University of Chicago School Mathematics Project, Home/School Partnerships section, para. 1), I have had feedback from parents in our district that find this program difficult to work with especially if they themselves have struggled with Mathematics. Parents want to understand how their children are solving problems and want to be able to assist their child with their homework. Parents want to be supportive, but often have to deal with their child being frustrated too. Students know that's not the way the teacher taught them how to solve the problem and conflict arises.

I focused on Unit Two and Unit Three of the fifth grade Everyday Math program. Unit Two is devoted to estimation and computation. Unit Three explores geometry concepts such as the following: angles, compasses, triangles, tessellations, and polygons. The EM website informs that EM is a complete instructional program and that, "Each Everyday Mathematics lesson includes time for whole-group instruction as well as small group, partner, or individual activities. These activities balance teacher-directed instruction with opportunities for open-ended, hands-on explorations, long-term projects and on-going practice." (The University of Chicago School Mathematics Project, n.d.). I saw a need to work more directly with struggling students. I created support materials in the form of worksheets to help support the parents and the student through these two units of study. I worked with these students in small groups and individually to help improve their math ability and their enjoyment of the subject. I created informative sheets to help parents better understand what we are trying to accomplish in the classroom. My focus was more on the insolated concepts that students need to know. I wanted to help students who learn by understanding the parts before dealing with the whole. Time was designated each day after math class to work with the struggling students. In small groups or individually, individual concepts that were taught that day were broken into smaller ideas. We then worked on practice problems that focus on that day's concept. I continued to follow the curriculum that EM prescribes; I just provided more support for those who learn better another way.

The fifth grade students at Evergreen Elementary in Waterford, Wisconsin will be the main participants. I pretested using the Unit Two and Unit Three pretests that my district had previously created to help identify students who struggle in these concepts. Then I also looked at their timed tests to also see what students struggled in the area of computation. My fifth grade students are approximately ten to eleven years old and were selected based upon their need. Based upon past school years of me teaching Everyday Mathematics, I estimated this to be a handful of students, approximately five to eight students. I compared my results to my colleague's fifth grade class. The district has required that we teach what is in our Everyday Math manual. She and I did that, which includes giving out the study-links at the end of each lesson. I added additional support and assessed if greater educational growth as well as increased student and parent satisfaction with math would result. All students were given a post test at the end of each of the two units and surveys at the beginning of the year and at the end of unit three to determine their academic and enjoyment growth.

For the short term I hoped to accomplish a higher level of participation in math class. For the long term I hoped that this would carry over to a higher level of enjoyment of school. I wanted my students to become more comfortable in the fact that all students have areas where they need to improve upon and that it is acceptable to need assistance. I really wanted students to walk away with an increased level of understanding of the topics discussed in the two units and a higher level of being a self-advocating learner. This was to be then shown in my student surveys and through the students' performance on their post tests.

As the 2010-2011 school year began, I started slowly with this project. I collected data as I began the school year by giving students and their parents a survey to find what level of comfort they are with the subject of math. Students at the fifth grade level in Waterford Graded School District are required to take daily timed tests to test their knowledge of addition, subtraction, multiplication, and division facts. I used this data along with pretests to determine the students I would be focusing on. My students first had a unit without the additional support. This was done to help the students notice there is a change in the way I am approaching my teaching of Everyday Math. When Unit Two began on October 4th students in my class and my colleague's class were given a pretest on the main concepts for Unit Two: Estimation and Computation. The data collected here along with the information provided from the timed tests helped me determine which students I provided additional support to. Then during the week of October 18th I gave a post test to students to see if the additional support increased their level of understanding of the concepts taught. Next, on November 1st I pretested students' knowledge of the concepts taught in Unit Three. I gave parents and students surveys to see if their comfort level with mathematics increased. This then gave me time in December to analyze the data and to report my findings.

I feel strongly that increased support helped improve the overall quality of the Mathematics program I am required to be teaching in Waterford. I really wanted my students to enjoy learning and I feel this is one way to accomplish it.

Chapter Two

Review of the Literature

The following research review focuses on the fact that while Everyday Mathematics has shown to be successful, and that differentiation still has its place to help struggling students. As teachers we all want our students to be successful. The research collected tells how when the practice of differentiation is applied, students have higher achievement. Therefore I concluded from the research that students needed more individual and small group help.

Currently my school district implements the Everyday Mathematics (EM) program. This is a researched-based mathematics program from the University of Chicago. Its first addition was released in 1988, and it is used in all fifty states (The University of Chicago School Mathematics Project, n.d.). Everyday Math is different than traditional math programs, because concepts are not taught isolation, but instead in connection to everyday life thru situations and ideas (The University of Chicago School Mathematics Project, n.d). All students do not learn the same way.

Sood & Jitendra (2007) conducted a study that looked at four first grade math textbooks and how they taught number sense to the general student population. Their study included comparing the way big ideas, conspicuous instruction, mediated scaffolding, and judicious review were taught. (p. 154). Three of the four textbooks were traditional math and one was EM. Sood and Jietenda (2007) found that, “Traditional textbooks included more opportunities for number relationship tasks than did EM; in contrast, EM emphasized more real world connections” (p. 154). They also found that, “Instruction was more direct and explicit and feedback was more common in traditional textbooks than it was in EM" (Sood & Jietenda, 2007, p. 154). This study emphasized to me that neither traditional math nor reform math is the perfect fit for every child, reform-based math being EM. In their conclusions Sood & Jietenda (2007) find, "… the reported findings indicate the need to improve mathematics textbook instruction, both reform-based and traditional, to enhance the learning of students with disabilities"(p. 154).

Everyday Mathematics is a good mathematical program (The ARC Center, n.d., p.5). Sood & Jietenda (2007) state that, "…EM emphasized (a) a variety of models to develop number sense concepts, (b) concrete, or semi concrete, to symbolic representational sequence within number sense lessons, and (c) hands-on activities using real-world objects to enhance learner engagement and learning" (p. 154). The ARC Center (n.d.) completed a study involving students from three different states and included 742 students. Three projects, The University of Chicago School Mathematics Project, the TIMS Project at the University of Illinois at Chicago, and TERC in Cambridge, Massachusetts produced curricula that produced in including other things Everyday Mathematics. Test scores were used as part of a two-year study to see if Everyday Mathematics did improve test scores in Illinois, Massachusetts, and Washington. The Illinois Standard Achievement Test (ISAT) was used in third and fifth grade in Illinois. Massachusetts Comprehension Assessment System (MCAS) was used in fourth grade in Massachusetts. Washington state used the Iowa Test of Basic Skills (ITBS) for third grade and the Washington Assessment of Student Learning (WASL) for forth grade. In fact the study states, "The data from this study show that these curricula improve student performance in all areas of elementary mathematics, including both basic skills and higher-level processes. Use of these curricula results in higher test scores." (The ARC Center, n.d., p.5). This study may have an underlying of bias because of the strong connection to the creator of the program. Everyday Mathematics was created specifically to discover a better way for teaching math. Therefore, one can conclude by the large scope of the study that reform math specifically EM is the correct course for teaching math.

The University of Chicago School Mathematics Project (2007) describes differentiation as "...a rich learning environment that provides students with multiple avenues for acquiring content, making sense of ideas, developing skills, and demonstrating what they know" (p. 1). They go on to inform that by adjusting how things are taught, educators give all students opportunities to engage in lesson content and to learn (p.1).

Carol A. Tomlinson (2001) informs us the following:

> A math teacher often differentiated process or activities for her students based on their readiness levels by assigning or offering homework assignments on the same topic at varying degrees of difficulty. She helped students determine which assignment would be most likely to both clarify their thinking and challenge them appropriately. (p. 51)

Tomlinson is not only explaining that teachers are responsible for the way in which a lesson is delivered, teachers are responsible for meeting the individual instructional needs of her/his students.

This is where EM disagrees. The University of Chicago School Mathematics Project (2007) states the philosophy of EM to be that all students will reach the Grade-Level Goals in EM and the benchmarks established in the district and state standards (p.1). Depending on where a student begins striving for these goals, they may not all be able to reach them.

Another source of information on supplementing EM is James E. Ysseldyke. He is an expert in the field of effective instruction. He has completed with colleagues, two studies on how additional support for Everyday Mathematics helped students improve test scores. Ysseldyke, Spicuzza, Kosciolek, & Boys (2003) study had 157 participants who used the EM program. The experimental group had accelerated instruction of a computer program that created individualized work for students based upon their ability level. The accelerated instruction consisted of students working more at their ability level. It was challenging the students, and yet they were able to complete tasks without being frustrated. While the study did find that there was growth with EM, it concluded that there was even more with accelerated instruction. Yesseldyke et al. concluded from their study that, “Positive relationships with academic responding were found for small-group and individual instruction” (p. 170). Yesseldyke et al. informed us that, “The work of educators to identify and implement effective instructional techniques is the first step to their improving student achievement” (p. 163).

In another study of supplement instruction with EM Ysseldyke & Tardew (2007) completed a study of 125 classrooms across 47 schools in 24 states that used a computer based instructional management system along with their Everyday Math program. This study found that, “Implementation of a progress monitoring and instructional management system had significant and profound positive effects on the performance of students in Grades 3 through 6” (Ysseldyke & Tardew, 2007, p. 24). Students who were given differentiated instruction were more likely to be happy in their math class as well. Ysseldyke & Tardew (2007) found,

> ... strong positive gains in mathematics performance we were able to demonstrate that students’ attitudes toward mathematics improve with

> the use of the progress monitoring system. And, we showed that teacher's reports of student performance and progress under the two treatment conditions strongly favored those who participated in the experimental group. (p. 25)

Positive attitude towards a subject helps one to attain the knowledge more easily.

Schoppek and Tulis's (2010) study focused on the belief that individualized practice of math would help improve the students' success. Their study looked at 113 students in third and fourth grade classrooms from Germany. Parents had to consent to them being a part of the study. Students who didn't gain permission from their parents were then part of the control group. They study used technology to help provide individualized instruction for the practice of their math skills. Schoppek & Tulis (2010) concluded that, "Another consequence of individualization is that each student works on problems of moderate difficulty, which is the condition for maintaining motivation because the problems are neither boring because of being too simple nor frustratingly difficult" (p. 250). The conclusion was also reached that, "...the success of our intervention mainly to individualization"(p. 250).

Strong, Perini, Silver, & Thomas (2004) point out that flexible grouping is one option when differentiating. They write, "Use flexible grouping: Identify a common purpose, such as developing accurate explanations in a unit on time, rate, and distance problems, and then divide students into different style groups that use alternate strategies. Style groups can validate or challenge students' dominant styles, depending on whether groups are style-alike or style-diverse" (Strong, Perini, Silver & Thomas, 2004, p. 76). Adams and Pierce (2006) write why these groups are necessary: Flexible grouping arrangements create opportunities to meet individual needs, which is the basis for differentiated instruction. Flexible is the key word. Students are rearranged for each lesson based on the lesson design and their individual needs" (p.

8). Heacox (2002) explains, “Flexible instructional grouping, however, is specifically intended to provide a better instructional match between students and their individual needs. When you group flexibly, you create instructional groups and prescribe specific activities that respond to students’ learning needs” (p. 85)

Çiftçi & Temel (2010) completed research to support individual and small-group instruction. Ten children between the ages of four and twelve that were assessed to be functioning at an age of 37-48 months were taught the concept of color in small-group settings or individually. Çiftçi & Temel (2010) used a single-subject research model of inter-subject multiple probing to discover that with prompting small-group and individually students could effectively learn their colors. This is one more example of how grouping and working individually can help students gain knowledge. Winebrenner (2001) inform that flexible grouping provides us with chances of reaching our goals.

The study done by Mazzocco & Devlin (2008) helped me to create one lesson to assess the students’ understanding of decimals. Mazzocco & Devlin had 106 students in sixth, seventh, and eighth grade who were shown on standardized tests to not have strong mathematics abilities. Their study concluded that, “... a simple task involving naming and rank ordering fractions and decimals may be a useful addition to in-class assessments used to determine children’s learning of rational numbers” (Mazzocco & Devlin, 2008, p. 681). This research has helped me to conclude that I need to have students do this simple activity to help me with my lessons on decimals.

The research done so far indicates that while Everyday Math is a good program for most students to have academic success, more needs to be done to reach students who are not successful. The research gathered here shows that flexible, small-groups, and individual support will help students improve their mathematic success. It has also given a powerful argument that differentiation is an important component for effective teaching.

Lawrence-Brown (2004) informs us, "Differentiated instruction is as important for students who find school easy as it is for those who find it difficult" (p. 37). They go on to enlighten us that all students make gains from having different teaching ways and providing the right amount of challenge and success. (Lawrence-Brown, 2004, p. 37). Tomlinson & McTighe (2006) have helped me to understand why I differentiate. Tomlinson & McTighe (2006) write,

> "Responsive or differentiated teaching means a teacher is attuned to students' varied learning needs as to the requirements of a thoughtful and well articulated curriculum. Responsive teaching suggests a teacher will make modifications in how students get access to important ideas and skills, in ways that students make sense of and demonstrate essential ideas and skills, and in the learning environment-all with an eye to supporting maximum success for each learner." (p18)

That is the type of teacher I strive to be, putting my students first so they can have the maximum opportunities for success.

Chapter Three

The Process of Implementation

History of the Project

I developed a way to differentiate my EM curriculum by identifying individual students who needed a better foundation in basic skills and providing them some individual instruction, and I evaluated the results of this effort by looking what progress was made in answering questions from the pretest to the posttest. What I wanted to find out by looking at students' pre- and posttest performance and by administering surveys to them and their parents was improved self-advocacy for their learning and an increased level of understanding the math concepts taught.

Currently my school district implements the Everyday Mathematics (EM) program. The district made the switch to EM because of the research showing higher student achievement tests scores than those using traditional programs. And much like this program, my district is very progressive. This is a researched-based mathematics program from the University of Chicago. Everyday Math is not like traditional mathematics programs because concepts are taught in connection to everyday life through situations and ideas (The University of Chicago School Mathematics Project, n.d). Traditional Math is teaching concepts in isolation while focusing heavily upon number sense. This is what I believed caused some students to struggle. They were working on trying to understand the how concepts relate to them and their lives and end up losing focus on the math concepts they have been taught. Everyday Mathematics is presented by teaching the larger concept first, and then identifying how to understand it. This works for many students. However I saw struggling students learn parts of the concept first, before understanding how the whole concept comes together. They needed big ideas being broken into simpler processes. These students often don't know their multiplication and division facts. For example when I asked them to solve a story problem involving 48 students divided among six tables, students often counted up by six on their fingers. It difficult for them to solve problems that deal with complex real-life issues when they don't have their basic facts understood. Students who still need to count on their fingers are often the ones who can't dissect story problems. My project addressed these students.

I have seen a need to find more support for my struggling students. Whereas the EM program has been proven to raise student test scores, I have seen students who have difficulty making growth with this program (The ARC Center, n.d., p.5). Everyday Mathematics states on its website that its purpose is to, "…provide opportunities for family members to participate in the students' mathematical learning" (The University of Chicago School Mathematics Project, Home/School Partnerships section, para. 1). Parental involvement is not only important because of the positive support that can be given to the child, but also to the teacher. Parents influence how the child feels about school and in this case math. I have had feedback from parents in previous school years stating that they find this program difficult to work with especially if they themselves have struggled with Mathematics. I conducted a survey to help address their frustrations (Figure 3.1).

Figure 3.1 Parent Math Survey

I have noticed with the switch to Everyday Mathematics that some parents and students continue to struggle with the different approach that it takes in teaching math. My goal with this survey is to better understand your frustrations and attempt to address them in the months of October and

November.

Thank you for your valuable input.

Rate the following questions 1 being the least and 5 being the most.

How comfortable are you currently with way your child is taught math? ______

How comfortable are you with math? ______

How much support do you feel you have been given to help your child ______
with math at home?

How much support do you feel your child has been given to help ______
your child with math at school?

Parents want to understand how their children are solving problems and be able to assist their child with their homework. One large example of this is teaching the lattice method of multiplication. Although for the student, it helps them multiply two or even three-digit numbers together, it is a very different way to multiply. Parents struggle with the lattice method, because they were never taught it in school. Parents want to be supportive, but often have felt they are teaching their students incorrectly. Students also get frustrated with their parents because they know that's not the way the teacher taught them how to solve the problem.

I focused on Unit Two and Unit Three of the fifth grade Everyday Math program. Unit Two is devoted to estimation and computation. Unit Three explores geometry concepts such as the following: angles, compasses, triangles, tessellations, and polygons. The EM website informs that it is a complete instructional program and that it has whole-group instruction as well as small group, partner, or individual activities which they believe help to create a balance of teacher-directed instruction along with other projects such as: open-ended activities, hands-on explorations, long-term projects and on-going practice. (The University of Chicago School Mathematics Project, n.d). I saw a need to work more directly with struggling students. I created support materials in the form of worksheets to help support the parents and the student through these two units of study. I worked with these students in small groups and individually to help improve their math ability and their enjoyment of the subject. I created informative sheets to help parents better understand what we are trying to accomplish in the classroom. My focus was more on the insolated concepts that students need to know. I wanted to help students who learn by understanding the parts before dealing with the whole. Time was designated each day after math class to work with the struggling students. In small groups or individually, individual concepts that were taught that day were then broken into smaller ideas. We then worked on practice problems that focus on that day's concept (Figure 3.2).

Figure 3.2 Details Additional Support for Struggling Students

Unit Two **Estimation and Computation**

Lesson 2.1 Estimation Challenge

Created an alternative worksheet (combined Math Master page 34 and the bottom of Math Master 33). for students' homework modify by removing the element of changing units of measure.

Lesson 2.2 Addition of Whole Numbers and Decimals

Examples of partial-sums method and column-addition methods for students and parents: Everyday Mathematics Resource Operations Handbook pages 18-23

Lesson 2.3 Subtraction of Whole Numbers and Decimals

Create examples of subtraction algorithms for subtraction for students and parents. Simplify study-link. Work on some problems in small group: Everyday Mathematics Resource Operations Handbook pages 28-41

Lesson 2.4 Addition and Subtraction Number Stories

Create vocabulary list for parents and students. Provide examples with study-link

Lesson 2.5 Estimate Reaction Time

Review vocabulary word: median in small group

Lesson 2.6 Chance Events

Create a chart of chance that is laminated for students to take home and review in small group (Math Master pg 49)

Lesson 2.7 Estimating Products

Review magnitude estimates with small group. Provide examples for parents and students

Lesson 2.8 Multiplication Whole Numbers and Decimals

Provide information on partial-product method, steps to completing decimal problems to students and parents. Work with students in small group to complete examples: Everyday Mathematics Resource Operations Handbook pages 46-61. Allow use of calculator and multiplication chart for additional support.

Lesson 2.9 Lattice Method

Create sheets for students and parents with examples and step by step instructions (student reference book pages 20 and 40). Work with students in small group to complete examples: Everyday Mathematics Resource Operations Handbook pages 50-59. Allow use of calculator and multiplication chart for additional support

Lesson 2.10 Comparing Millions, Billions, Trillions

Complete large number worksheets with students in small group

Unit Three **Geometry Exploration and the American Tour**

Lesson 3.1 Introduction to the American Tour

Review in small group chance chart

Lesson 3.2 American Tour: Population Data

Review large numbers in small group

Lesson 3.3 Exploring Angles

Allow student use of geometry template and completion of study-link in small group. Review that circles=360, lines=180, corners of squares=90

Lesson 3.4 Using a Protractor

Review definitions of acute, right, obtuse, and reflex angle in small group.

Lesson 3.5 Using a Compass

Review vocabulary adjacent and vertical angles, and practice measuring angles in small group

Lesson 3.6 Congruent Triangles

Review types of triangles in small group

Lesson 3.7 Properties of Polygons

Play game: Polygon capture with students in small group. Send games home for students to play with parents

Lesson 3.8 Regular Tessellations

Share pictures of M.C. Escher with small group and have discussion.

Collaboration with art teacher for further reinforcement

Lesson 3.9 Angles of Polygons

Give angle measurement totals for Polygons:

Triangle=180, Square=360, Pentagon=540, and so on

Explain formula: number of sides * 90 = total number of sides in a polygon

Lesson 3.10 Using Geometry Template

Complete study-link with students in small group

I continued to follow the curriculum that EM prescribes; I just provided more support for those who learn better another way.

Participants

The fifth-grade students at Evergreen Elementary in Waterford, Wisconsin were the main participants. I pre-tested prior to teaching each of the units. The Unit Two and Unit Three pretests were created by my district previously and help identify students who struggle in these concepts. Then I also looked at their timed tests to also see what students struggle in the area of computation. My fifth grade students are approximately ten to eleven years old and were selected based upon their need through classroom observation and failure on the pretest questions. Based upon past school years of me teaching Everyday Mathematics, I knew to estimate this to be a handful of students, approximately five to eight students. How many students I worked with varied depending on the concept taught and was never more than five per day. I compared my results to my colleague’s fifth grade class. The district requires that we teach what is in our Everyday Math manual and that we give daily timed tests. She and I did that which includes giving out the study-links (a short homework worksheet) at the end of each lesson. I added additional support to see if there is greater educational growth as well as increased student and parent satisfaction with math. My group was the experimental group and my colleague's class was the control group. All students were given a posttest at the end of each of the two units and surveys at the beginning of the year and at the end of unit three to determine their academic and enjoyment growth.

As the school year began I sent home a survey (see Figure 3.3) to all the students in my mathematics class as well as my colleague’s.

<u>Figure 3.3 Student Math Survey</u>

Rate the following questions 1 being the least and 5 being the most

How well you like school day knowing that you will have math class? _______

What things do you like about Math class?

Whole class work? _______

Individual work? _______

Partner work? _______

Small Group work? _______

Small Group work with the teacher? _______

How comfortable are you in asking for help in math class? _______

I let my teammate and my district know of my project and plans, and they just asked to be kept informed of progress. This data was used in determining who the struggling students in both classes are.

Research Questions

For the short term I hoped to accomplish a higher level of participation in math class. I wanted my students to ask more questions of how problems were solved. For the long term I hope that this will carry over to a higher level of enjoyment of school. I wanted my students to become more comfortable in the fact that all students have areas where they need to improve upon and that it is acceptable to need assistance. I really wanted students to walk away with an increased level of understanding of the topics discussed in the two units and a higher level of being a self-advocating learner.

Data Gathering

The first unit of study I modified was entitled: Estimation and Computation and began October 4^{th}, 2010. Students began this unit by taking a pretest, simply entitled Unit Two Pretest, which had previously been created by other members of my district and me. This was used to see what lessons need to have additional support. There are ten lessons in this unit. Support materials were modified and enhanced for both parents and students. Everyday Mathematics does supply worksheets that helped me to better support my students. I also modified some to fit the needs of my students (Figure 3.2). During our time studying the unit students were given extra assistance. Often I explained the support materials, and I gave students additional help with their daily assignment. By the week of October 18th a post test created by Everyday Mathematics was given to gage progress made. A comparison of the pretest and the posttest informed me if students who were given additional assistance mastered the concepts. I also looked to see if progress has been made on conquering the on going timed tests.

The week of November 1st, 2010 we began Unit Three, Geometry Explorations, which contains 8 lessons. Here too students first took a previously created pretest called Unit Three Pretest. Support materials again for both parents and students was distributed and explained. By the Thanksgiving break students took a posttest for this unit. Comparisons were made between the pretest and posttest to see if progress had been made. Students could earn partial credit for test questions, therefore data will not always be whole numbers. Data from the timed tests were included in this information as well.

Data Analysis

With each lesson in the two units, I created a comparison chart to show the average improvement of my class on each of the tested concepts (Figure 3.4).

Figure 3.4 Comparison Chart: Experimental Group

Pretest	***Post Test***	***Difference***	***Standard***	***Questions***
The Average Percent of Questions correctly answered	The Average Percent of Questions correctly answered			
Unit 2				
5.08	15.42	10.33	Add and subtract whole numbers and decimals	1, 2, 3, 4, 5, & 6
1.00	17.00	16.00	Making magnitude estimates	7
1.00	16.50	15.50	Convert between U.S. customary units of length	8
1.00	18.50	17.50	Identify the place of digits	9
Unit 3				
8.17	23.00	14.83	Identify right, straight, reflect, obtuse, and acute angles & Measure Angles	1, 2, 3, & 4
1.00	10.00	9.00	Identify place value digits in numbers to billions	5
1.00	14.67	13.67	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	6, 7, & 8
0.00	11.67	11.67	Identify right, isosceles, equateral, and scalene triangles	9 & 10
2.00	11.67	9.67	Identify Polgons	11 & 12
0.00	11.67	11.67	Identify right, straight, reflect, obtuse and acute angles	13 & 14

This showed my students' progress with learning the identified concepts of the unit. I then created an informative chart using the data collected from my colleague’s class. I hoped for at least an average of 80% success rate on each of post tested concept questions in her classroom. In my teammate's class, I hoped to see success as well. Although I hoped my increased efforts would result in my students having higher than an average of 80% success rate on the tested concepts.

Figure 3.5 Comparison Chart: Control Group

Pretest	Post Test	Differeence	Standard	Questions
Average Number of Students who Answered Correctly	Average Number of Students who Answered Correctly			
Unit 2				
4.17	12.33	8.17	Add and subtract whole numbers and decimals	1, 2, 3, 4, 5, & 6
0.50	11.50	11.00	Making magnitude estimates	7
0.00	6.50	6.50	Convert between U.S. customary units of length	8
1.00	16.50	15.50	Identify the place of digits	9
Unit 3				
4.50	11.25	6.75	Identify right, straight, reflect, obtuse, and acute angles & Measure Angles	1, 2, 3, & 4
1.00	11.00	10.00	Identify place value digits in numbers to billions	5
0.00	16.67	16.67	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	6, 7, & 8
0.00	3.00	3.00	Identify right, isosceles, equateral, and scalene triangles	9 & 10
4.00	10.00	6.00	Identify Polgons	11 & 12
0.00	7.67	7.67	Identify right, straight, reflec, obtuse and acute angles	13 & 14

Modifications to Original Plan

I had to start with gaining permission to send home surveys to both students and their parents. Permission was granted by my district administrator, but my original questions were altered. Reasons were not given to why the changes were made. Instead of asking a parent how comfortable they were with how their child was taught math, I was instructed to ask, I understand the way my child was taught math. I wanted to ask parents how comfortable they were with math. My district asked me to phrase the question as understanding mathematics has been and was an easy process for me. The largest changes were to my last two parent questions. I wanted to ask how much support you feel you have been given to help your child with math at home. It was changed to I would like more knowledge of the daily math lessons my child learns. This flipped on the type of answer I wanted to receive. I couldn't compare the results directly with other item responses on the five-point scale. Now instead of a rating of five, I would want a lower number at the end of my study. The last question on my survey was also changed quite a bit. I had it written as how much support do you feel your child has been given to help your child with math at school. The question was changed entirely. It was changed to I believe math is a crucial tool in the learning process for my child. As I expected, I didn't get any parent that rated this less than a five. For these reasons and the limited number of responses, I have decided to leave out the parent surveys in my final analysis.

Summary

The process for me to complete my project took just a little over six weeks to complete. I began the year simply informing my parents of my project and gain insight to their thoughts on EM. Then I taught one unit in Everyday Mathematics without additional support to gauge a baseline. Next I taught two units with the increased support. Finally I collected an analyzed the data to assess if my goals had been attained.

Chapter Four

Findings

Before I started this project I had confidence in my teaching ability. I knew that I could successfully teach mathematics to most students. My hope was to also help more students find math an enjoyable subject as well. I wanted parents to have more positive thoughts about Everyday Mathematics.

Survey Results

Parent Surveys

Parent surveys were not included in my final results due to the changes required my district. Post surveys were sent by e-mail and response to returning these were low. Only one parent out of 21 returned the survey. I chose to leave this information out, as I felt it wasn't correctly implemented.

Student Surveys

While my student surveys were changed as well, their changes were not large. I felt that they could still be useful to me understanding if I'd accomplished my goal. The survey was first given to 21 students at the beginning of the year. The survey consisted of seven questions using the five-point Lickert scale, with a five meaning a lot and one meaning a little. The surveys helped me see while math isn't their favorite subject in school, students were self-advocates for themselves.

The first question asked was, is math your favorite class. My intent here was to see if I could help students enjoy math class more. Surveys were handed out in class and were returned anonymously. Surveys were collected by all twenty-one of the students, (100%). The average response was a 2.52. Four students rated this question a one, six students rated it a two, four students rated it a 3, six students rated it a four, and one student rated math as their favorite class a five.

In item two, students indicated on a five-point scale how much they enjoyed each of five methods for receiving math instruction, with five indicating high enjoyment and one indicating very little enjoyment. Here I tried to get a better understanding of what aspects students enjoyed about math. I also wanted to see if how much they liked the individual attention and small group work with me benefited their enjoyment of mathematics. The first was working as a whole class. The average was a 3.85 out of 5. Individual work was the next question students had to rank their liking of. The average for liking individual work was 2.71 out of 5. Partner work was ranked on average at 3.95 on a 5-point scale, five being high. Students were then asked to give their ranking to how much they enjoyed small group work, and the average was 3.86. Working with the teacher in a small group was the next question. Here the average was 3.29 out of a possible 5. This led me to conclude that students all have their individual preferences and there was no clear preference among the class as a whole.

The next question was changed to do you ask questions when you do not understand math. Although the question was altered, this question still gave data to the students' advocating for themselves. The average response for this question was 4.43 out of 5. One student did respond with a one ranking, no students gave it a ranking of two, one student ranked it as a three, six students ranked it as a four, and 13 students ranked it as a five.

The next question helped me see if I was allowing time for my students to respond. It was the following: Are you given time to ask questions in math class? No students ranked this a one or a two, five students ranked it a three, four students ranked it a four, and 12 students ranked it a five.

December 3, 2010, students had finished the third unit and I distributed the post survey to 20 students. When I asked the students if it was their favorite class, the average response rose to 3.1. After our work only two students ranked math a one, four students ranked it a two, seven students marked a three, four students ranked it a four, and three students ranked it a five. This is an average rating gain of 0.58 from before the study to afterwards.

When it came to students ranking how they felt about whole class instruction, students' responses showed that they liked it less. No students ranked it a one, four students ranked it a two, four students ranked it a three, seven students ranked it a four, and five students ranked whole class instruction a five. The average decrease amount was 0.20.

How much students liked to working on their own increased. The average post experiment was 3.1. That is up 0.39. The break down is as follows: two students ranked it a one, four students ranked it a two, three students ranked it a three, eight students ranked it a four, and three students ranked it a five.

Students' likeness towards working in small groups independent of the teacher decreased by 0.41. The post survey average was 3.45. One student ranked this question a one, one ranked it a two, four ranked it a three, six ranked it a four, and seven ranked it a five.

However students' attitude toward working in small groups with the teacher increased. The average was 3.5. This is an increase of 0.21. Four students ranked it a one, one student ranked it a two, three students ranked it a three, five students ranked it a four, and seven students ranked it a five.

When asked if students were given enough time in class to ask questions they responded with an average of 4.55. This is an increase 0.60. This was the largest increase I had in my survey data. No students ranked this question with a one or a two, two students answered with a ranking of three, five students ranked it a four, and 13 students ranked it a five.

Finally students were asked whether they asked questions when they don't understand. Here the average ranking decreased by 0.18. The post survey showed an average of 4.25. No students ranked it a one, two students ranked it a two, two students ranked it a three, five students ranked it a four and 11 students ranked it a five.

Analysis of Unit Tests

I also compared my instruction to a colleague's. As mentioned earlier I wanted to see if my additional individual and small group instruction had an impact on students' learning. I compared test data concept-by-concept through the pre-post differences in the control group to the pre-post differences in the experimental group to find out which group changed more and in what direction, positive or negative. I also discussed the data with my teammate. The overall view of the data was good. We both made gains from pretest to posttest. Numbers reported were based upon how much of the test question was answered correctly. For example, students may have answered the question half right and therefore given half credit. All numbers reported were not whole numbers as a result.

My colleague was the control group (Figure 4.1 & 4.2) and had gains in all 11categories that were the focus of units 2 and 3.

For the standard of adding and subtracting whole numbers and decimals her pretest class average correct responses were 4.17 and posttest were 12.33. That is a gain of 8.17. For the standard of making magnitude estimates, my teammate had a gain of 11. She went from just one student getting half a question correct to an additional 11 students answering it correctly on the posttest. The next standard was to convert between U.S. and customary units of length. This was not taught directly in the units identified. However it had been taught in the previous grade. Everyday Mathematics spirals. It introduces a topic and comes back to it later through practice. Data in my colleague's class went from no one answering it right on the pretest to six and half questions answered it correctly on the posttest. The last standard for Unit Two was identifying the place of digits. Here one question was answered correctly on the pretest and 16.50 were answered correctly on the posttest, for a difference of 15.50.

For unit 3 my colleague's success continued. For the standard of identifying right, straight, reflect, obtuse, and acute angles and the ability to measure angles scores went from 4.50 average to 11.25 average, a gain of 6.75. Standard Identifying place value digits in numbers to billions went from 1 on the pretest to 11 on the posttest, for a gain of 10. Next, students had to use the geometry template to draw right, isosceles, equilateral, and scalene triangles. Students were stumped on the pretest, but 16.67 questions were scored correctly on the posttest. Her students were also puzzled by identifying these triangles. However on the posttest three questions were answered properly. Then students needed to identify polygons. Here four questions correctly answered on the pretest and 10 answered correctly on the posttest. This gave a gain of 6. Finally students needed to identify right, straight, reflex obtuse, and acute angles. No students were successful on the pretest, but an average of 7.67 responses were right on the posttest.

My class was the experimental group (Figure 4.3-4.4) and also had gains in all 11 categories that were the focus of units 2 and 3. For the standard of adding and subtracting whole numbers and decimals my pretest average correct responses were 5.08 and posttest were 15.42. That is a gain of 10.33. For the standard making magnitude estimates, I had a gain of 16. I went from just one question correct to an additional 17 responses on the posttest. The next standard was to convert between U.S. and customary units of length. Again this was taught only through practice during the lesson and I did not provide any additional support. I had one answer correct on the pretest to 16.50 correct answers on the posttest. This was again of 15.50. The last standard for unit 2 was to identify the place of digits. Here one correct response on the pretest and 18.50 correct on the posttest, for a difference of 17.50.

My students continued to make gains on unit 3 as well. For the standard of identifying right, straight, reflect, obtuse, and acute angles and the ability to measure angles scores went from 8.17 average to 23.00 average, a gain of 14.83. Students had to answer an additional Standard Identify place value digits in numbers to billions went from one question right on the pretest to nine on the posttest, for a gain of eight. Next students had to use the geometry template to draw right, isosceles, equilateral, and scalene triangles. Only one answer was accurate with this question on the pretest, but 14.67 questions were scored correctly on the posttest, for a gain of 13.67. My students next had to identify these types of triangles. No students were successful on the pretest, however 11.67 was the average correct responses on the post test. Then students needed to identify polygons. Here an average of two questions were answered correctly on the pretest and 11.67 were answered correctly on the posttest. This gave a gain of 9.67. Finally students needed to identify right, straight, reflex, obtuse, and acute angles. No students were successful on the pretest, but an average of 11.67 true answers were on the posttest.

Figure 4.5 Percentage Gained Chart

Unit 2 Test Questions	***Control Group***	***Experimental Group***	***Unit 3 Test Questions***	***Control Group***	***Experimental Group***
1	40.48%	42.86%	1	40%	35.71%
2	50.00%	35.71%	2	15%	30.95%
3	-9.52%	54.76%	3	40%	64.29%
4	59.52%	73.81%	4	65%	80.95%
5	40.48%	52.38%	5	50%	42.86%
6	52.38%	35.71%	6	85%	71.43%
7	52.38%	76.19%	7	80%	47.62%
8	30.95%	73.81%	8	85%	47.62%
9	73.81%	83.33%	9	65%	85.71%
			10	85%	80.95%
			11	70%	85.71%
			12	60%	71.43%
			13	55%	80.95%
			14	60%	80.95%

Chapter Five

Conclusions

As I reflect upon this experiment I have confirmed many things. The largest confirmation was that my colleague and I teach mathematics well, and students are learning in our classrooms. But to be honest I never thought that wasn't true. I also have known that students learn with the Everyday Mathematics program. I have seen students who are trying so hard to understand the real world situation that EM provides, that they loose focus on the math. EM is presented by teaching the whole to the parts. Many struggling students learn parts to the whole. I wanted to help reach more of those students who were struggling to keep up.

I wanted them to become advocates for their own learning. I was happy to see that more students enjoyed math class. That is one indicator that I am doing a good job of getting students excited about learning math. My students' survey results also showed me that students want to be working with me in small groups or want to work in partners or independently. This shows me that students are taking responsibility for their learning. They don't want to be just one of the crowd. However these results cannot be conclusive because students admitted on their survey that they don't ask questions when given the opportunity. I know they are working on becoming better self-learners, but they have a way to go.

My parents' surveys didn't work out how I would have liked. But I have gotten positive feedback through phone calls, emails, and in person of how their child likes math more and/or that they are doing better in math this year. I would have known if the supplemental materials I supplied to parents helped ease their frustrations with Everyday Mathematics.

When looking at the data summarized the charts of before and after the pretests, I know that both my colleague and I are reaching students. Of course I wish I was reaching every student. I want them all to be successful. This experiment has taught me that I need to continue to go above and beyond what is supplied by my district and do all I can to reach my students.

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Appendix A

Unit 2 Control Group Pre & Post Test Questions

Unit 2 Control Group Pre & Post Test Questions

Question	***Pre 1***	***Post 1***	***Pre 2***	***Post 2***	***Pre 3***	***Post 3***	***Pre 4***	***Post 4***	***Pre 5***	***Post 5***	***Pre6***	***Post 6***	***Pre 7***	***Post 7***	***Pre 8***	***Post 8***	***Pre 9***	***Post 9***
Student																		
1	half	x		x	x	half		x		x		x	half			half		x
2	half	half		half				x				x						
3	half	x	half	x	x	x		x		half		x		x		half		x
4	half	x		half	x	half		half		half		x		half				x
5		x		x	x	half		x				x		x		x		x
6		x			x							x		x			half	x
7																		
8	half	x		x				x		half		x		x		half		x
9		x		half	x	half		x		half				half				x
10		x		half				x		half		x						x
11	half				x						x							
12	half	half		half		half		half		half						half		x
13	half	x		x	x	x		x		half		x		x		half		x
14	half	x	x	x		x		x		x		x		x		half		x
15	half		x	x	x	x	x	x		x		x		x		half		x
16		x		x		half		x		x		x		x		half		x
17		x		half	x									half		half		x
18	half	half		x	x	x					x	x		x				x
19	half	x		x	x	x		x		x	x	x		x		x	half	x
20	half	half				x		half										half
Skill	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Making magnitude estimates	Making magnitude estimates	Convert between U.S. customary units of length	Convert between U.S. customary units of length	Identify the place of digits	Identify the place of digits
Totals	6.5	15.0	2.5	13.0	12.0	10.0	1.0	13.5	0.0	8.5	3.0	14.0	0.5	11.5	0.0	6.5	1.0	16.5
Percentages	30.95%	71.43%	11.90%	61.90%	57.14%	47.62%	4.76%	64.29%	0.00%	40.48%	14.29%	66.67%	2.38%	54.76%	0.00%	30.95%	4.76%	78.57%
Gains		40.48%		50.00%		-9.52%		59.52%		40.48%		52.38%		52.38%		30.95%		73.81%

Appendix B

Unit 2 Control Group Pre & Post Test Questions

Unit 2 Experimental Group Pre & Post Test Questions

Question	***Pre 1***	***Post 1***	***Pre 2***	***Post 2***	***Pre 3***	***Post 3***	***Pre 4***	***Post 4***	***Pre 5***	***Post 5***	***Pre6***	***Post 6***	***Pre 7***	***Post 7***	***Pre 8***	***Post 8***	***Pre 9***	***Post 9***
Student																		
1	half	x		half		x		x		x	x	x	half	half		x		x
2	half	x		x		half		x		half		x		x		x		x
3	half	x	half	half		x		x		half		x		half		x		x
4	half	x		half	half	x										x		half
5	half	x	half	half		x		x		x		x		x		x		half
6	half	x	x	x		x		x			x	x		x		x		x
7	half	x		half	half	half		x		half	x	x		x		x		x
8	half	half		half	half	half		x		half		half		x		half		half
9		x		half	x	x		x		x		x		x				x
10		half		half		x		half		x		x		x		x		x
11	half	x	half	half	half	x		x		half	x			x		x		x
12																		
13		half		half	half	x				x				x				x
14	half	half		half	half	x		x			x	x		half		x		x
15	half	x		x	half	x	x	x			x	x	half	x		x		x
16	half	half	half	x	half	x		x		half	x	x		x		half	x	x
17	half	half		x	half	x		x		half		x		half		x		x
18	half	x	x	x	half	x	x	x		half	x	x		x		x		x
19	half	x	x	x	x	x		x		x		x		x	x	x		x
20	half	half		x		x		x		half	x	x		x		x		x
21		x		x		x		x		half		x		x		half		x
Skill	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Add and subtract whole numbers and decimals	Making magnitude estimates	Making magnitude estimates	Convert between U.S. customary units of length	Convert between U.S. customary units of length	Identify the place of digits	Identify the place of digits
Totals	7.5	16.5	5	12.5	7	18.5	2	17.5	0	11	9	16.5	1	17	1	16.5	1	18.5
Percents	35.71%	78.57%	23.81%	59.52%	33.33%	88.10%	9.52%	83.33%	0.00%	52.38%	48.26%	78.57%	4.76%	80.95%	4.76%	78.57%	4.76%	88.10%
Gains		42.86%		35.71%		54.76%		73.81%		52.38%		35.71%		76.19%		73.81%		83.33%

Appendix C

Unit 3 Experimental Group Pre & Post Test Questions Part A

Unit 3 Experimental Group Pre & Post Test Questions Part A

Question	Pre 1	Post 1	Pre 2	Post 2	Pre 3	Post 3	Pre 4	Post 4	Pre 5	Post 5	Pre6	Post 6
Student												
1		x	x	x	x	x		x				x
2			x					x		x		
3		x	x	x		x		x				x
4												
5		x	x	x		x		x		x		x
6				x								x
7												
8		x	x	x		x		x		x		x
9	x	x		x		x		x		x		x
10				x								x
11				x		x						x
12						x						x
13			x		x		x	x	x	x		x
14		x	x	x		x		x		x		x
15		x	x	x	x	x		x		x		x
16	x	x	x	x		x		x		x		x
17			x	x								x
18		x		x	x	x		x		x		x
19		x		x		x		x		x		x
20			x					x		x		x
Skill	Identify right, straight, reflect, obtuse and acute angles & Measure Angles	Identify right, straight, reflect, obtuse and acute angles & Measure Angles	Identify right, straight, reflect, obtuse and acute angles & Measure Angles	Identify right, straight, reflect, obtuse and acute angles & Measure Angles	Identify right, straight, reflect, obtuse and acute angles & Measure Angles	Identify right, straight, reflect, obtuse and acute angles & Measure Angles	Identify right, straight, reflect, obtuse and acute angles	Identify right, straight, reflect, obtuse and acute angles	Identify place value digits in numbers to billions	Identify place value digits in numbers to billions	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles
Totals	2	10	11	14	4	12	1	13	1	11	0	17
Percentage	10.00%	50.00%	55.00%	70.00%	20.00%	60.00%	5.00%	65.00%	5.00%	55.00%	0.00%	85.00%
Gains		40.00%		15.00%		40.00%		65.00%		50.00%		85.00%

Appendix D

Experimental Group Pre & Post Test Questions Part

Unit 3 Experimental Group Pre & Post Test Questions Part B

Question	Post 7	Pre 8	Post 8	Pre 9	Post 9	Pre 10	Post 10	Pre 11	Post 11	Pre 12	Post 12	Pre 13	Post 13	Pre 14	Post 14
Student															
1	x		x		x		x		x		x				x
2	x		x		x		x		x				x		x
3	x		x		x		x		x		x				
4					x										
5	x		x		x		x		x	x	x		x		x
6	x		x		x		x		x		x		x		x
7															
8	x		x		x		x		x		x		x		x
9			x				x				x		x		
10	x		x				x				x				
11	x		x		x		x		x		x		x		x
12															
13	x		x		x		x		x	x	x		x		x
14	x		x				x		x	x	x		x		x
15	x		x		x		x		x		x		x		x
16	x		x		x		x		x		x		x		x
17	x		x		x		x		x		x				x
18	x		x				x		x		x				
19	x		x		x		x		x	x	x		x		x
20	x		x				x				x				
Skill	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	I dentify right, isosceles, equateral, and scalene triangles	I dentify right, isosceles, equateral, and scalene triangles	I dentify right, isosceles, equateral, and scalene triangles	I dentify right, isosceles, equateral, and scalene triangles	I dentify Polgons	I dentify Polgons	I dentify Polgons	I dentify Polgons	Identify right, straight, reflect, obtuse and acute angles	Identify right, straight, reflect, obtuse and acute angles	Identify right, straight, reflect, obtuse and acute angles	Identify right, straight, reflect, obtuse and acute angles
Totals	16	0	17	0	13	0	17	0	14	4	16	0	11	0	12
Percentage	80.00%	0.00%	85.00%	0.00%	65.00%	0.00%	85%	0.00%	70%	20.00%	80.00%	0.00%	55.00%	0.00%	60.00%
Gains	80.00%		85.00%		65.00%		85%		70		60.00%		55.00%		60.00%

Appendix E

Unit 3 Experimental Group Pre & Post Test Questions Part A

Unit 3 Experimental Group Pre & Post Test Questions Part A

Question	***Pre 1***	***Post 1***	***Pre 2***	***Post 2***	***Pre 3***	***Post 3***	***Pre 4***	***Post 4***	***Pre 5***	***Post 5***	***Pre6***	***Post 6***
Student												
1	half	x				x		x				x
2	half	x	x	x		x		x				
3	half		half	x	x	x		x		x		x
4			half	x		x		x				
5				x		x		x				x
6	half	x	x	x	x	x		x		x		x
7	half	x	x	x		x	x	x	x	x		x
8			x	x				x				
9	half	x	x	x		x		x			half	x
10		x		x		x		x		x		x
11		x		x		x		x				x
12												
13	half		x									
14	x			x		x		x		x		x
15	half	x	x	x		x		x		x	half	x
16	x	x	x	x	half	x		x		x		x
17	x	x		x	x	x				x		x
18	half	x	x	x	half	x		x				x
19		x		x		x		x		x		x
20		x	x	x		x		x		x		x
21		x	half	x	half	x		x		x		x
Skill	Identify right, straight, reflec, obtuse and acute angles & Measure Angles	Identify right, straight, reflec, obtuse and acute angles & Measure Angles	Identify right, straight, reflec, obtuse and acute angles & Measure Angles	Identify right, straight, reflec, obtuse and acute angles & Measure Angles	Identify right, straight, reflec, obtuse and acute angles & Measure Angles	Identify right, straight, reflec, obtuse and acute angles & Measure Angles	Identify right, straight, reflec, obtuse and acute angles	Identify right, straight, reflec, obtuse and acute angles	Identify place value digits in numbers to billions	Identify place value digits in numbers to billions	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles
Totals	7.5	15	11.5	18	4.5	18	1	18	1	10	1	16
Percentage	35.71%	71.43%	54.76%	85.71%	21.43%	85.71%	4.76%	85.71%	4.76%	47.62%	4.76%	76.19%
Change		35.71%		30.95%		64.29%		80.95%		42.86%		71.43%

Appendix F

Unit 3 Experimental Group Pre & Post Test Questions Part B

Unit 3 Experimental Group Pre & Post Test Questions Part B

Question	***Pre 7***	***Post 7***	***Pre 8***	***Post 8***	***Pre 9***	***Post 9***	***Pre 10***	***Post 10***	***Pre 11***	***Post 11***	***Pre 12***	***Post 12***	***Pre 13***	***Post 13***	***Pre 14***	***Post 14***
Student																
1		x		x		x		x		x		x		x		
2		x		x		x		x		x		x		x		
3		x		x		x		x		x		x		x		x
4				x		x		x		x						x
5				x		x		x		x		x		x		x
6				x		x		x		x		x		x		x
7		x		x		x		x		x						x
8		x		x		x		x		x		x		x		
9		x								x		x		x		x
10				x		x		x		x		x		x		x
11		x		x		x				x		x		x		x
12																
13																
14				x		x		x		x		x		x		x
15				x		x		x		x		x		x		x
16				x		x		x		x		x		x		x
17				x		x		x		x		x		x		x
18		x		x		x		x		x		x		x		x
19		x		x		x		x		x		x		x		x
20		x		x		x		x		x		x		x		x
21				x		x		x	x	x	x			x		x
Skill	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	Use the Geometry Template to draw right, isosceles, equilateral, and scalene triangles	Identify right, isosceles, equateral, and scalene triangles	I dentify right, isosceles, equateral, and scalene triangles	I dentify right, isosceles, equateral, and scalene triangles	I dentify right, isosceles, equateral, and scalene triangles	I dentify Polgons	I dentify Polgons	I dentify Polgons	I dentify Polgons	Identify right, straight, reflec, obtuse and acute angles	Identify right, straight, reflec, obtuse and acute angles	Identify right, straight, reflec, obtuse and acute angles	Identify right, straight, reflec, obtuse and acute angles
Totals	0	10	0	18	0	18	0	17	1	19	1	16	0	17	0	16
Percentage	0.00%	47.62%	0.00%	47.62%	0.00%	85.71%	0.00%	80.95%	4.76%	90.48%	4.76%	76.19%	0.00%	80.95%	0.00%	80.95%
Change		47.62%		47.62%		85.71%		80.95%		85.71%		71.43%		80.95%		80.95%