

The Use of Math Sprint in a Tutorial Program for Seventh Grade Students to Improve End of Grade Test Scores

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***Abstract*— Analyzing the effects of using a “Math sprint tutorial model” on seventh grade students at Elizabeth City Middle School in Elizabeth City North Carolina. This unique learning technique was used during a four-week study group of four seventh grade students to improve the “End of the grade” (EOG) test scores. Each student was given a 40 question pre-diagnostic exam with questions similar to those of an EOG exam. The pre-test questions covered topics from the “North Carolina Mathematics Standard Course of Study” which consisted of five competencies: data analysis and probability, measurement, number and operations, geometry, and algebra. The North Carolina Mathematics Standard Course of Study is based on a philosophy of teaching and learning mathematics that is consistent with the current research, exemplary practices, and national standards. A total of three math sprint tutorials were given to help students advance in areas such as problem solving, comprehension, and test taking skills. The students used math sprint strategies and practices in preparation for the post-diagnostic exam. The post-diagnostic test was given to observe the student’s progress and improvement from the pre-diagnostic exam. The student’s work methods, behavior, learning styles, and results were closely examined throughout the experimentation. The pre and post diagnostic exam results were surveyed for improvement comparisons.**

Key Words: data analysis and probability, measurement, number and operations, geometry, and algebra, Visual, Auditory and Kinesthetic (VAK)

I. INTRODUCTION

How can we obtain students interest in math and improve the EOG test scores? The use and purpose of the North Carolina Mathematics Standard Course of

Study and the “Math Sprint Tutorial Model” is to enhance and improve the grades and test scores of middle school students in the state of North Carolina.

The Standard Course of Study describes the mathematical conceptions, skills, procedures, and relationships that are the substantial mathematics that all North Carolina students should learn and understand. The North Carolina Mathematics Standard Course of Study is organized in five strands or goals for K-8: data analysis and probability, measurement, number and operations, geometry, and algebra. It is the fundamental guide for textbook selections and the foundation of the North Carolina testing program.

Math sprint is a strategy designed to help middle school students. Elizabeth City State University sponsors a Math Sprint program headed by Dr. Darnell Johnson. This program involves students completing problems; from the State’s Release Items of the previous years’ tests, in a timed environment in order to receive points for correct answers. This method uses competition to motivate student learning over a period of time. In return, helps students develop better learning and cooperative skills, as well as enhance their knowledge of the subjects presented when doing math sprint. This was an essential part of the team’s project with middle school students from Elizabeth City Middle School. The Mathematics Team goal was to observe if tutoring and using Math Sprint to re-teach seventh grade students would help to increase the scores of the spring 2012 End-of-Grade (EOG) test.

What is the purpose of the EOG? “The North Carolina EOG tests are designed to measure student performance on competencies specified in the goals and objectives of the North Carolina Standard Course of Study. The test has two main purposes: to assure that all students obtain minimum skills and knowledge necessary to function as a member in society after graduating high school and to establish additional means for making the education system at state, local, and school levels accountable to the public for results. Students are expected to demonstrate grade-level proficiency by scoring at or above achievement level III on the test as well as well as understanding important

principles , concepts and relate mathematical information on everyday situations.

II. COURSE PLAN

Before working with the seventh grade students from Elizabeth City Middle School, the team had to research a variety of materials in preparation for tutoring and teaching. The research began with each team member analyzing the “North Carolina Mathematics Standard Course of Study” as well as mathematical statistical articles such as the “Reports of Disaggregated State, School System (LEA) and school Performance Data for 2008-2010”. The research process also consisted of studying “Bloom’s Taxonomy” which “attempts to divide cognitive objectives into subdivisions ranging from the simplest behavior to the most complex.” This method focuses on topics such as comprehension, application, Analysis, synthesis and evaluation.

Do all students learn the same? Each team member was required to understand that the students may have different learning styles in a system known as VAK, “Visual, Auditory, and Kinesthetic (Tactile). Visual learners need to see the teacher’s body language and facial expressions to fully understand the content of the lesson. Auditory Learners learn best through verbal teachings rather than seeing it. Kinesthetic (Tactile) learners learn best through a hands-on approach. (They also may find it hard to sit for long periods of time.) It is important to realize the learning styles of each individual student in order tackle the students’ needs in understanding the material being given.

The team was given a couple of weeks to form a course plan for the students. The course plan followed the requirements and studies of the “North Carolina Mathematics Standard Course of Study” and its five competencies: data analysis and probability, measurement, number and operations, geometry, and algebra. The five competencies were broken down into “Goals” from the North Carolina Testing Program (EOG Grade 7 Math Sample Items). The goals were shared among the team.

Each team member was responsible for a goal (or two) and was required to review and understand the goals. The five goals were to be taught over the four week period. The team then gathered the five goals and put together a 40 questions diagnosed test for the study group. Each of the four team members selected ten questions based on the goal that they were responsible for teaching. The questions came from a variety old EOG example questions from online. The students that would be attending the program would be a selected

group of students from Elizabeth City Middle School who struggled in math and whose results were poor on the previous EOG test from the fall 2011. The subjects that the team were given, were materials that the students had already learned at school but still struggle in.

The agenda for the study group was to start off each session with instructions of the goal being taught for each day and allowing the students to work the problems out through individual warm ups and team work assignments. After each lesson the students would be given a math sprint tutorial to improve their time management skills during test as well as improve their ability to work under pressure all while providing a fun learning environment to keep the students excited about math. The math sprint would also play the role as a review for observing the students knowledge of what they learn after each lesson or two.

III. OBSERVATIONS

A. Study group

The team and study group met for one hour on Tuesdays and Thursdays from 5:00pm to 6:00 pm over the course of eight weeks. The team expected a study group of about twenty students or more however during the first week only a total of three students showed up. On the first day three students arrived with their parents. The parents were given a team introduction and a brief explanation and purpose of the “Math Sprint Tutorial” Program. The students received a 40 question pre-diagnostic exam with no calculators and 40 minutes to complete the exam.

After the exam the team had the opportunity to sit and chat with the students about their learning styles and what they expected to learn out of the program. The three students all agreed their best learning style was Kinesthetic (Tactile). The team also learned that the students had already known each other from school. On the third day one more students joined the study group, resulting in a study group of four students. The fourth student received the pre-diagnostic exam with the same amount of time as the other students and no calculator.

The team also learned that the four students had already known each other from school. It was important to observe the students behavior and interaction with one another to avoid any distractions or playing during the sessions. Farther more, the team didn’t have any behavior problems from the students. The team also observed the students team work methods, behavior and skills. The students were separated into two teams of two whenever they were given group assignments or math sprints. The team observed which students were stronger

in certain math areas. It was essential to not put the two stronger students on the same team during the math sprints. The teams were balanced to give all the students a fair chance at completing the math sprints and other group assignments.

B. Student Attendance

Upon arrival, students were required to sign an attendance sheet that was used to not only document their presence, but to analyze if absence and tardiness affected the students' performance. Monitoring their attendance through graphs and percentages revealed that the students' absences didn't affect the student performance. Student A missed 2 days, student B missed 1, and both student C and D missed 3 days. However, lateness did play a role for one student. 3 out of 4 students came on time when present. Student C struggled to keep up during tutoring sessions because of lateness. It was evident that on days when Student C was on time, the student participated more and was further in tuned to what was being taught.

The first day, students A, B, and D were on time and able to complete the 40 minute diagnostics test that the team created. Student C had taken the test the following meeting, while the other students started the tutoring sessions. This test became the Team's central guide for developing a more fixed study plan based off how the students scored and their needs.

The team also noticed that the absences were mainly due to weather, such as rain. One student fell ill for a couple of days but returned and was still able to maintain and grasp the concepts being taught. Absences and lateness sometimes disrupted the team's study plan. One student was 20 minutes late on a scheduled Math Sprint day. The team had to wait for the student to catch up to the others before continuing the Math Sprint. There was one rainy day where 1 out of 4 students showed, and the tutoring session turned into one on one tutoring for the present student. These types of occurrences pushed back plans, but the team was able to regroup by developing new plans for the upcoming dates.

C. Math Sprint

Math sprint was incorporated in between the lessons to challenge the students on the curriculum they learned. The Math Sprint was given three times during the tutoring session. The students were given 20 minutes max to complete the sprint. There were two student teams of two. The way that Math Sprint works is that the teams are given a certain number of problems that placed on separate pieces of paper. These papers are then placed at a central

location in the class room with the tutors standing by. The papers are numbered, and each team has the same group of problems to complete. The problems are taken from the lessons in the curriculum. Once a student team leader is chosen, on "Go", the leaders quickly retrieve the first problem from the central location and take it back to their seat. The students work together to complete the problem. When completing the first problem, the leader rushing back to retrieve the next problem. This is repeated until the final problem is complete. The Math Team looked over the problems as they turn them in, and return the incorrect ones for the students to fix.

The first Math Sprint scores were extremely low. Both student teams had only 1 out of 5 correct. The low scores are believed to be a result of the students rushing to get done first, instead of getting more correct. The Math Team then expressed the importance of not only finishing problems in a timely matter, but actually getting the problems correct. In the second Math Sprint, the teams did better, but one team continued to rush through the problems. Team 1 had finished first, but had 2 out of 5 correct, while Team 2 had 3 out of 5 correct but finished last. By the last Math Sprint, the Math Team had boosted the number of problems to seven. The students did exceptionally better as they appeared to have grasped the concept that it's better to get more correct and take longer, than to rush and finish first and have more problems incorrect. By this time, the teams worked at a steady fast pace and were in parallel coordinate with their opposing team. Both teams finished within seconds of each other and had 6 out of 7 correct.

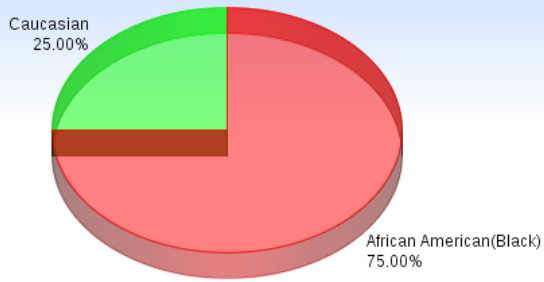
The students were rewarded for winning and participating in the Math Sprints. The Team also had other games to keep the students attention while learning and having fun doing so. Math Jeopardy and a math related scavenger hunt was also incorporated in the lessons.

IV. DATA

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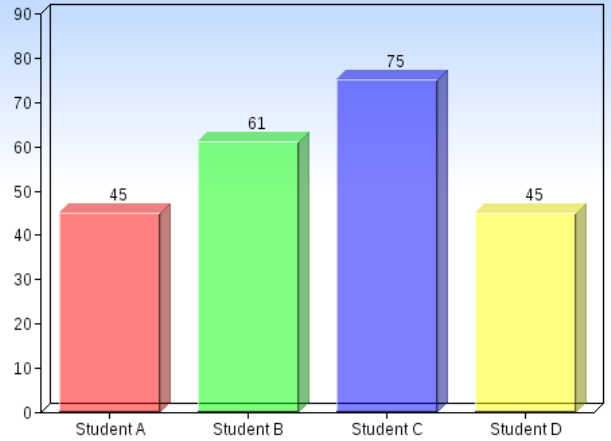
Ethnicity

Students in the Class



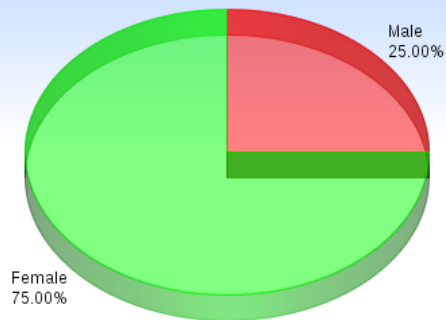
Improvement

Accuracy in Questions Answered (2nd Test)



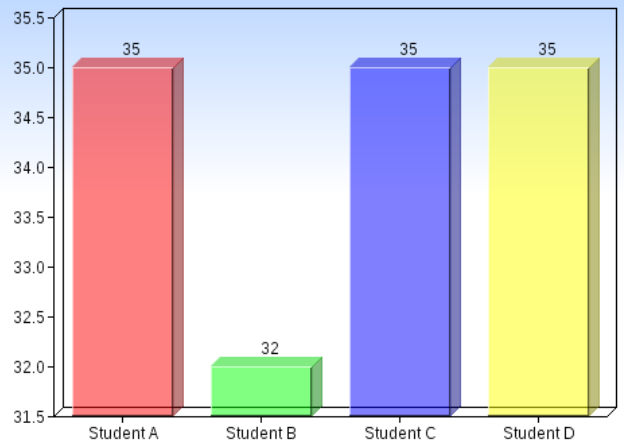
Gender

Students in the Class



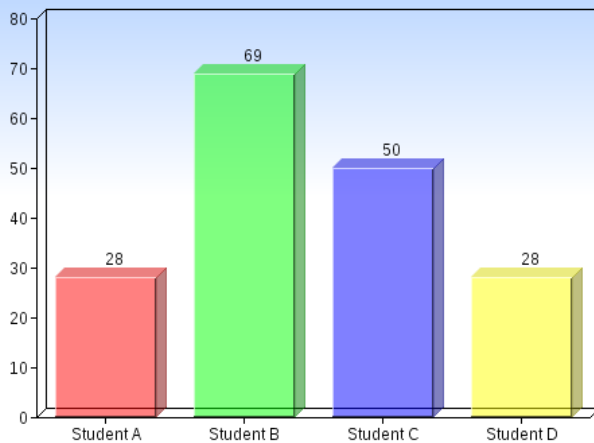
Diagnostic Test

Given Forty Minutes for Forty Questions (Speed)



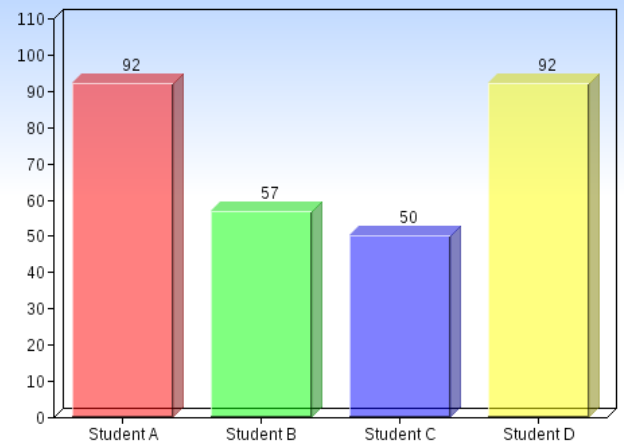
Diagnostic Test

Accuracy in Questions Answered



Diagnostic Test

Given Forty Minutes for Forty Questions (Speed)



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